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The collateral relationship between sound effects and music in selected media

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THE COLLATERAL RELATIONSHIP BETWEEN SOUND EFFECTS AND MUSIC IN SELECTED MEDIA

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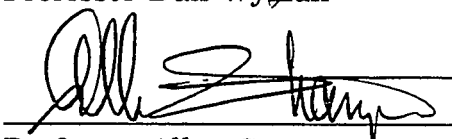

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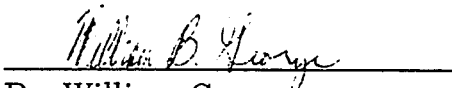

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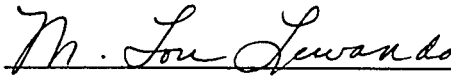

ABSTRACT

THE COLLATERAL RELATIONSHIP BETWEEN
SOUND EFFECTS AND MUSIC IN SELECTED MEDIA

by Patricia Lynn Eastman

This thesis investigates media soundtrack elements generally referred to as sound effects and music. A clear delineation rarely exists in actual practice. Sound montage techniques blend into the domain of timbral scoring so frequently that isolation of these production tasks is in many cases counterproductive. The ways in which collaboration between the sound designer and the composer can enhance the effectiveness of a soundtrack are examined.

A set of considerations for the creation of a successful soundtrack is formulated including issues of functionality and interactivity. These considerations are applied across boundaries of current and future media, including film, computer games, theme park attractions, and virtual reality. Analysis of media segments produces examples of success and failure, where the soundtrack either achieves a symbiotic meld of elements, or contains areas of element interference and competition.

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PREFACE

This paper began as a means to study the process involved in creating sound effects and music, the reasons for various stylistic and creative choices, and soundtrack structure. As part of this research, many professionals in the audio entertainment field were interviewed. Often these interviews resulted in a gratifying exchange of ideas and resources. In the process, this project evolved from an academic requirement to a type of creative cross-pollination of different crafts and media. Hopefully, this paper and the work that will surely follow it will constitute a small contribution to the evolution of the art of the soundtrack.

Tish Eastman October 20, 1994

INTRODUCTION

> Sound effects should not be compartmentalized. If you understand the proper use of sound effects in one medium, you can apply this knowledge to the other media. The only differences are the techniques, and the equipment employed.[1]

The primary focus of this paper will be the continuum of soundtrack elements generally referred to as "sound effects" and "music." It will be shown that a clear delineation of these elements rarely exists in actual practice. The domain of sound effects and sound montage techniques overlaps into that of timbral scoring so frequently that isolation of these creative processes can be counterproductive.

A discussion of the soundtrack will be applied to a range of media, regardless of differing technologies involved. It will be shown that the use of music and sound effects enhances the impact of media environments whether film, computer media, theme park attractions, or virtual reality.

A large volume of research material is available on the subject of film. The process of creating a film, while still evolving technologically, has stabilized into a fairly standard methodology. The content of other media can be seen as derivative of the theater/radio/film continuum, and accordingly, film will often be used as a springboard to understanding newer forms.

Film can be considered a collaborative art, a single work created by artists from many disciplines. In actuality, however, the contemporary

[1]Robert L. Mott, *Sound Effects: Radio, TV and Film* (Boston: Focal Press, 1990), 190.

feature film is manufactured in a process that resembles an assembly line more than an artistic collaboration. Sound effects and music are often tacked on at the end of the process, after having been created in isolation both from each other and from the other components of the film. This is usually attributed to budget and time considerations, which is true to a certain extent. The underlying issue however, is one of antiquated perspective: sound is still viewed as something to be "added" to film, a hold-over from the days of "silent" cinema.

The problems that current production methods cause are well documented. "Fighting it out on the dubbing stage" is often an accurate description of the final process in the creation of a soundtrack. The composer and sound designer rarely have any meaningful communication before dubbing, and any communication at that point is not likely to be productive. To make matters worse, frequently the filmmaker has not made a final creative decision about how a film, or its component scenes, should be treated: just sound effects, just music, a little of each, a lot of each, music used as sound effects, or sound effects used as music. Time and energy are often wasted creating a section of sound that is either cut or obscured by sonic competition. Most industry professionals struggling with daily deadlines and technological limitations cannot afford the luxury of standing back to gain perspective on their industry. Yet without this perspective, future technology may be plagued by the same problems.

What are the alternatives? What different type of sensibility or approach has been used in the creation of more successful soundtracks?

What can the exceptions, as well as the general rule, teach that might improve future projects and bring greater awareness to collaboration? These are some of the questions that will be dealt with in the following chapters.

Perspectives on the connection between different forms of media and the components of the soundtrack will be explored. A set of critical criteria will be developed and applied across boundaries of current media. This analysis will yield examples of successful soundtracks which achieve a symbiotic meld of elements, and those which fail to do so. In the process, the set of considerations for the creation of a successful soundtrack will be tested.

The media examples chosen are biased by the tastes of the author, but the representative genres of science-fiction, horror and action-adventure usually offer the most latitude to the creators of the soundtrack. In this respect, the selection is a justifiable one.

CHAPTER 1

Soundtrack Elements

> It is the business of the sound film to reveal for us our acoustic environment, the acoustic landscape in which we live, the speech of things and the intimate whisperings of nature; all that has speech beyond human speech, and speaks to us with the vast conversational powers of life and incessantly influences and directs our thoughts and emotions, from the muttering of the sea to the din of a great city, from the roar of machinery to the gentle patter of autumn rain on a window pane. The meaning of a floor-board creaking in a deserted room, a bullet whistling past our ear, the death-watch beetle ticking in old furniture and the forest spring tinkling over the stones. Sensitive lyrical poets always could hear these significant sounds of life and describe them in words. It is for the sound film to let them speak to us more directly from the screen.[1]

A film soundtrack contains three basic elements: dialogue, sound effects and music. In most treatments of the subject, those categories are discussed as if they are always clearly delineated. In actual practice, although the soundtrack is usually created in terms of these three elements–with each one assigned to a different person or team–it can more accurately be described as a sound spectrum, a sonic palette of creative possibilities. Each element has more in common with, and is more dependent upon, the other than the traditional division would suggest. This chapter will examine these elements, and explore the range from dialogue to naturalistic effects, from sound design and timbral scoring, to tonal (orchestral) scoring and an often overlooked element, silence.

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[1]Bela Balazs, *Theory of Film* (London: Dennis Dobson, 1952), 197.

> Just as the sound editor assembles his sound effects to create an almost musical effect in some sequences, so the music composer creates the instrumental background to become at times an additional sound effect in itself.[2]

Dialogue

> The composition of the sound track is characterized by islands of complex sound layering punctuated by long segments of dialogue.[3]

Dialogue is not, strictly speaking, within the scope of this paper. However, it is interesting to note that, although dialogue is usually recorded during production, it is often not intelligible enough to be used in the final soundtrack, particularly in feature films. This leads to the necessity of automatic dialogue replacement (ADR), a process in which dialogue not recorded during production or not intelligible on the production track is recorded and synchronized to the picture. [4]

> We were lucky on *Jurassic Park* because the recordist did a very good job of recording the dialogue. We only had to replace about five hundred lines of dialogue, which wasn't much for this kind of film. On *Backdraft,* we replaced something like 2500 lines of dialogue because there was so much background noise from the fires on the set.[5]

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[2]Ernest Walter, in Elisabeth Weiss and John Belton, eds., *Film Sound: Theory and Practice* (N.Y.: Columbia University Press, 1985), 55.

[3]Tony Zaza, *Audio Design: Sound Recording Techniques for Film and Video* (Englewood Cliffs, New Jersey: Prentice-Hall, 1991), 13.

[4]Stanley R. Alten, *Audio in Media* (Belmont, California: Wadsworth, 1990), 51.

[5]Don Shay and Jody Duncan, *The Making of Jurassic Park* (New York: Ballantine Books, 1993), 141.

Through ADR, dialogue becomes part of audio post-production, leaving it open for creative treatment.

Dialogue Processed as Sound Effects

The distinction between dialogue and sound effects is not always clear. This is especially true in the case of animated and special effects films.

The Disney animated film, *Beauty and the Beast,* for example, required extensive processing of the beast's voice. To help match the actor's voice with the animalistic character depicted on the screen, animal growls were mixed in with the spoken lines, and dialogue was pitch-shifted to deepen the voice.[6]

An example from *Star Wars* are the "vocalizations" of R2-D2. With an assortment of noises, sound designer Ben Burtt was able to communicate emotion and, to a certain degree, meaning (helped by occasional translation by C-3PO). Darth Vader's voice was also processed in post-production, to give it a mechanical, menacing tone, and to blend it with the vocalized breathing tracks that accompany his appearances in the film.

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[6]Tom Kenny, "Beauty and the Beast: Disney's Latest Looks and Sounds Like the Classic It Is," *MIX* 16, no. 1 (Jan. 1992): 87-88.

Sound Effects (natural)

> Sound effects are sounds that correspond to real objects and real events or they represent imagined or implied objects, events, or spaces. Effects are *special* if they must be re-created in the studio or *natural* if they have been recorded on location.[7]

Natural sound effects are generally taken from field recordings, production sound recordings and "wild tracks" (recordings made on location that are not synched to picture).[8] Production tracks are often not very useable. Aside from the general problems of extraneous and inappropriate noises (such as airplanes flying overhead during filming of a scene set in the 17th century), the microphone does not always do a good job of isolating background elements, or capturing real world sound in a way that is identifiable to the ear.[9]

The location recordist is often not in communication with the sound editors that will be responsible for adding sound effects later. Wayne Allwine, in talking about his work at the Walt Disney Studio, said that if they were lucky, they could ask for a certain production vehicle, or special gadget, to be recorded on location for them to use later. But typically, they would have to find it elsewhere, or imitate it as best they could.[10]

This is not always true. Sound designer Gary Rydstrom was able to

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[7]Zaza, op. cit., 105.

[8]Robert L. Mott, *Sound Effects: Radio, TV and Film* (Boston: Focal Press, 1990), 182.

[9]Elisabeth Weiss and John Belton, eds., *Film Sound: Theory and Practice* (N.Y.: Columbia University Press, 1985), 364.

[10]Wayne Allwine, telephone interview with author, 13 Sept. 1994.

record sound effects at the steel mill that appears in *Terminator 2.* [11] This gave him an appropriate palette of effects to manipulate for the film. But situations like this are the exception, not the rule.

In discussing sound effects, the issue of realism needs to be addressed. It was mentioned earlier that the microphone does not always interpret sound in a way that is identifiable to the ear. In sound design terms, this means that often an alternative source needs to be used that sounds more real than the real thing. Sound designer Walter Murch:

> What we are striving for is the creation of sounds that, when put together with an image, will seem appropriate to that image and to its emotional context. In many cases the sounds one hears are not the same as the sounds one would hear if actually present at that location, but they should be in character with the subject, expand upon the image, and 'feel realistic'.[12]

Thus, although sound effects may appear to be "natural" and an integral part of the scene, they are generally an illusion created in post-production, to be consistent with the needs of the film.

> Effects are rarely used in a strictly realistic way–and even when this is attempted, it is generally a heightened realism which owes a great deal to art.[13]

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[11]Kenny, op. cit., 63.

[12]Walter Murch, in Roy Paul Madsen, *Working Cinema: Learning from the Masters* (Belmont, Calif.: Wadsworth Publishing Co., 1990), 292.

[13]Alec Nisbett, *The Technique of the Sound Studio* (New York: Hastings House, 1970), 256.

Sound Effects (designed)

> Are improbable sounds, fantastic or grotesque noises possible at all? We can imagine fairies or witches or ogres or dragons and other fairy-like characters and draw them too–but fairy-tale sounds, fairy-tale voices and noises...what are they like? We can invent all sorts of non-existent and impossible things but we cannot invent impossible sounds.[14]

Bela Balazs wrote that statement in 1952, when he could not have foreseen the degree to which digital audio (including sampling technology and computer processing of sound) would transform sound editing into sound design. Creating impossible sounds is a sound designer's stock in trade. Sound design creates non-literal sound, that is "sound effects that do not exist in reality," or in simpler terms, the sound of one thing used to represent the sound of something else.[15]

Foley is the term used for sound cues performed live to film, usually on a stage designed for that purpose, by people who have specialized in that art.[16] Foley effects can be literal sounds like footsteps, door slams, gunshots, body hits and grunts.[17] Foley effects can also be non-literal sounds, such as cellophane crinkled up to sound like fire.[18]

Foley artists generally show a great degree of imagination when it comes to finding or inventing ways to create a certain effect. In the early

[14]Balazs, op. cit., 232.

[15]Steve Barnett, "Film Sound Editing Techniques," *Recording Engineer/Producer* 13, no.1 (Feb. 1982): 65.

[16]Mott, op. cit., 192.

[17]Mott, loc. cit.

[18]Weis, op. cit., 365.

years of the studio, the Disney sound effects department had an assortment of thousands of sound-producing instruments and contraptions useful for creating non-literal sound cues.[19] These could be as simple as using coconut shells for galloping horse hooves, or as complex as this device, created by Jimmy MacDonald:

> The train is two, two-by-fours joined in the center, around which has been formed a single steel bar, and it has notches about every 16 or 18 inches. There's a hub that comes out of the center of these two-by-fours, and a metal rod that rises out of that hub, to which Jimmy attached a long wooden arm, that went over to the edge of the track, and another arm hooked on and went down. At the end of the arm going down there were two roller skates. On top of the roller skates was a wooden box full of lead window-sash weights and there was a handle on top of this. Now what you would do is straddle the track, and you would make a gesture, sort of like stirring a big bowl of something. And you'd get the window-weights and the roller skates rolling around this big section and, because of the notches in the track, the sound was exactly like a train! [There] is also this series of pipes that he had set up with this big old cardboard speaker; he had notched a valve four times so that when you turn the valve you've got four chugs for every turn and pumped high pressure air into it. The combination of that and the train track, and you had a steam train! When this thing was at rest, it would sit there and the steam would pour out of it, just like a steam train. When it started up slowly, you had a train! You can hear it in *Dumbo*: Casey Jr. is Jimmy's train.[20]

The effective thing about this type of device is that, although non-literal, the sounds produced could be in many cases more realistic than the real thing, especially given the limitations of location sound recording in the early days.

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[19]John Halas and Roger Manvell, *The Technique of Film Animation* (N.Y.: Hastings House, 1959), 77.

[20]Allwine, loc. cit.

There is a special talent involved in looking at an object and imagining how its sound might be used for something else. When the added flexibility of modern sampling and sound processing technology is thrown into the creative mix, the possibilities are virtually limitless. The process becomes one of selecting carefully from among the options the one sound that fits with the visual moment. Walter Murch:

> When you first think about a scene your tendency is to be more literal. But the more you look at it from the side, rather than confronting it directly...you can come up with things that are very unlikely, yet you put them in and it seems to work. It works because, if it's a well-chosen sound, the audience (which includes yourself) responds to it, both because it does resonate with something that is going on inside the characters, and because it's reasonable that this sound would be there.[21]

Often a sound will end up being a mixture of literal and non-literal sounds, for instance real thunder mixed with a woman's scream to give it more impact.[22] The advantage of doing this is that it allows sound to communicate the reality of the event, in addition to providing us with some emotive content.[23]

The most creative opportunities in sound design often come from special effects films of the horror or science fiction genre.[24] Because the creatures in these films usually have no real-life counterparts, the sonic

[21]Jeff Forlenza and Terri Stone, eds., *Sound for Picture: An Inside Look at Audio Production for Film and Television* (Emeryville, CA: Mix Books, 1993), 5.

[22]Mott, op. cit., 59.

[23]Herbert Zettl, *Sight, Sound, Motion: Applied Media Aesthetics* (Belmont, Calif.: Wadsworth Publishing Co., 1973), 340.

[24]Ibid., 347.

imagination is given free rein. How do you make a sound for something that has never been heard? One solution, used by Gary Rydstrom in *Jurassic Park,* was to combine animal and other sounds to create an extensive raptor vocabulary. Sound designer Ben Burtt created a universe full of sounds for *Star Wars* based on similar combinations of real-world sounds, including recording the roar of a freeway through a vacuum-cleaner pipe for the sound of a landspeeder.[25]

Cartoon sound effects (such as a "boing" when a character gets hit on the head) are also examples of non-literal sounds.[26] There is even more flexibility in a cartoon sound since it can be non-literal and also completely inappropriate to the context yet still get a laugh.

> 'Toons' provide the ideal setting for auditory invention. *Inverted counterpoint,* for instance, is the use of sounds wholly out of their natural context and inserted for humorously unexpected effects. The designer can make a world that does not exist sound plausible while creating ironic twists.[27]

Non-literal sound can also be used asynchronously, that is: not tied to a particular visual object or event. The most frequent examples of this are sound effects in off-screen space (signifying events happening beyond the edges of the scene being pictured), and sound effects being cross-faded into the next scene (such as the sound of a raging battle getting carried into the next image of farmland, then faded out as the tranquil sound of birds singing is faded in).

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[25]Weiss, op. cit., 366.

[26]Zettl, op. cit.,338.

[27]Zaza, op. cit., 132.

Asynchronous sound can also be used to mislead the audience and give them false expectations (a mysterious scratching around the edges of the door sounds frightening when the cause is unseen, and then with relief it turns out to be the neighbor's cat). Horror films specialize in using asynchronous sound in this manner to build suspense:

> As for sound effects, their separation from their source can produce suspense that ranges from the familiar off-screen footsteps...to the mysterious noises and screeches throughout *The Haunting* (1963), whose effects...remain unexplained and unidentified.[28]

Asynchronous sound can be effective since we regularly tend to perceive sound in a disassociated manner. We rarely continue watching an object once it is linked to a sound. If a baby cries in a crowded store, we look up to locate the baby. Once we have located the source of the cries we go on about our business, even though we are still hearing crying. According to Siegfried Kracauer, all of this sound is asynchronous except for the moment when image and sound are linked (i.e. when we look at the crying baby). Another more common example is the manner in which we listen to conversation in groups: we watch the speaker and occasionally look around for reactions, briefly check the surroundings, come back to the speaker. During this period we are listening to what is being said, but we are doing so without consistent visual stimulus.[29]

We constantly tune sounds in and out without need for visual confirmation (bird songs, traffic noises, etc.). We easily push familiar

[28]Weiss, op. cit., 65.

[29]Siegfried Kracauer, *Theory of Film* (New York: Oxford University Press, 1960), 115.

sounds (like the sound of our car engine) into the background, while unusual or unexpected sounds (like a loud ping suddenly coming from our car engine) jump to the foreground to the seeming exclusion of all others.

This is a strong point in favor of a selective use of sound effects. We neither need or expect to hear every detail of our sonic environment. When we are engaged in an activity we tend to selectively focus on the relevant sounds. Soundtracks that do not have a selective approach–ones that try to interpret every visual event ("see a dog, hear a dog")–will not be as effective.

> Sound excludes certain distracting elements. The designer need only provide the most basic of auditory information to achieve the desired effect. The superfluous in the visual becomes ornamental business; with the aural, the unnecessary becomes a confusing nuisance.[30]

As a final point in the consideration of designed sound, the question arises as to why we are so forgiving of non-literal sound? Why do we not leap from our theater seats in loud protest that the landspeeder sound is nothing more than a freeway recorded through a vacuum tube? One theory is as follows:

> Although a given sound may be associated with a certain environment, if the visual information suggests that we are elsewhere, the auditory evidence will often be overruled and the visual interpretation will dominate....Auditory expectations are less crucial than are visual expectations to our interpretation of the physical world. Thus, toying with them has less effect on our sense of place.[31]

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[30]Zaza, op. cit., 29.

[31]Myron W. Krueger, *Artificial Reality II* (Reading, Massachusetts: Addison-Wesley, 1991), 139-140.

Sound Effects Used Compositionally

> The audio designer's power stems from the abstract expressiveness of clear, precise sounds, which perform as a kind of dramatic music while not being music per se.[32]

This section on sound effects used compositionally–or musically–will include musical sound effects in animation, sound montage, and the use of samplers in sound design. But first, a brief discussion of the delineation between noise and music is necessary.

In his investigation into "what makes a tune," John Booth Davies describes certain conditions under which noise (e.g. sound effects) can be perceived musically:

> If the noise is patterned in some way, then whether it will be liked or not should depend on the complexity of the pattern. The author has...seen people standing near to a compressor, tapping their feet and apparently enjoying the simple polyrhythmic accents which some such machines emit.[33]

Davies goes on to state that much of the difference between a perception of noise as musically acceptable or unacceptable is completely subjective.[34] Often non-musical sounds can begin to function musically.[35]

Early animated film repeatedly crossed the line between sound effects and music. Often, Jimmy MacDonald was called upon to create an effect

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[32]Zaza, op. cit., 28.

[33]John Booth Davies, *The Psychology of Music* (London: Hutchinson, 1978), 95.

[34]Ibid.

[35]Roy M. Prendergast, *A Neglected Art: A Critical Study of Music in Films* (New York: New York University Press, 1977), 55.

that otherwise (in traditional film) would fall in the ken of the composer. One example, from the scene in *Snow White and the Seven Dwarfs* in which everyone is playing musical instruments, follows:

> To achieve the sound for the organ, the imagination of sound effects creator Jim MacDonald was truly tested. He came up with the idea of having studio personnel blow into large jugs.[36]

Another lesser known example is found in Disneyland's *Haunted Mansion.* As guests pass through the portrait gallery (past sounds of rain and thunder) they approach the loading area, where an eerie musical cue plays, featuring flute, tubular bells, and musical wind in unison with the flute. Jimmy MacDonald performed this wind sound live to tape as part of the musical score.

Montage is a rare opportunity where the composer or sound designer may get to stretch creatively without having to be continually married to the visuals. It is characterized by an absence of dialogue, which leaves room on the soundtrack. Most often a montage segment will feature a musical cue, or will showcase a song.[37] Less frequently it can be a creative moment for the sound designer. A vivid example of a sound effects montage occurs in *Apocalypse Now,* created by sound designer Walter Murch:

> To indicate the character's yearning to be out in the jungle, Murch successively phased over each of the city sounds with a jungle sound: the policeman's whistle became the cry of a

[36]David Tietyen, *The Musical World of Walt Disney* (Milwaukee, Wisconsin: Hal Leonard publishing, 1990), 40.

[37]Marvin M. Kerner, *The Art of the Sound Effects Editor* (Boston: Focal Press, 1989), 14.

> tropical bird....City progressively became jungle, one sound at a time, over a period of thirty seconds....The emotional state of the protagonist was clearly at the point where he was prepared to undertake a dramatic action that would trigger the story of *Apocalypse Now.* [38]

Another facet of sound effects being used musically has evolved with the increasing use of sampling keyboards in audio post-production. Samplers enable a sound designer to perform "live" to film, and therefore potentially make the sound designer's process very similar to that of the Foley artist. Gary Rydstrom works this way frequently, using a Synclavier. In his work for Walt Disney World's *Body Wars,* Rydstrom talks about performing the breathing effects live to picture. He calls it "a quick and human way of working" and says that the cue had a "certain musical dimension that wouldn't have been there otherwise."[39] In *Jurassic Park,* this technique was used for the breathing and footsteps of the tyrannosaurus rex .[40]

Another aspect of the use of sound samplers in sound design is flexibility. A sound designer can almost instantaneously load in sounds and try out any combination of ideas in real time. As Rydstrom states:

> It's very easy on the Synclavier to instantly combine stuff, play it backward, play it at a different pitch, and start seeing that maybe if you add an alligator growl with an elephant trumpet and a camel, maybe that would be interesting. It's like cooking.[41]

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[38]Madsen, op. cit., 298.

[39]Michael Marans, "Sound Effects: From Footsteps To Space Ships," *Keyboard* 16, no. 3 (Mar. 1990), 41.

[40]Gary Rydstrom, e-mail to author, 10 Oct. 1994.

[41]Gary Rydstrom, in Tom Kenny, "Welcome to Jurassic Park: Sound Design for Steven Spielberg's Dinosaur Epic." *MIX* 17, no. 7 (July 1993): 131.

In performance of sound effects, there can be a greater sense of artistry and connectedness with the image than when merely cutting in effects or punching in sound cues according to an edit decision list (EDL).[42] Rydstrom again:

> Since rhythm is an indispensable element of effects cutting, performing on a keyboard can be more satisfactory than slowly cutting individual effects until they eventually make a stiff rhythm. Usually, the more organic the better![43]

This method can lead to a more musical interpretation of the sound components as well. Travis Powers, sound effects artist for *The Simpsons:*

> I like to think of each event musically, like a triad: blending a low bass sound with one or two medium or high upper parts for a real beefy sound....Sometimes I'll make a large patch on the keyboard and then I'll play the events in real-time to picture.[44]

In the realm of computer games, Michael Land believes that, although the current usage of sound effects for one shot screen events is more equivalent to Foley in film, future sound designers will be able to create more ambient textures either in real-time or by pre-mixing digital files (similarly to the sound design process discussed above). He states that:

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[42]Russell Brower, e-mail to author, 13 Sept. 1994.

[43]Gary Rydstrom, e-mail to author, op. cit.

[44]Greg Rule "Inside the Simpsons," *Keyboard* 19, no. 1 (Jan. 1993): 51.

> When this type of technique is employed, the role of the music in the sonic space will need to adjust accordingly, and the line between sound and music, as in film and TV, will at times become blurred.[45]

Music Used as Sound Effects

> The developed use of special effects is always trespassing over the border into the sphere of music itself. The effects are not only orchestrated carefully in association with the music; they can easily become part of the music itself.[46]

In early animation it was common for sound effects to be performed live, as part of the musical score which was generally being recorded simultaneously. For this reason, the job required some precise musical abilities, which explains why so many of the early sound effects people, including Jimmy MacDonald, were percussionists.[47] Often the sound effect-producing devices were musical instruments, for example: Jimmy MacDonald used an old trombone to create the chugging sounds of Mickey Mouse's car.[48] Other examples are described as follows:

> To color the sound track further, Disney rounded up tin pans, slide whistles, ocarinas, cowbells, nightclub noisemakers and a washboard.[49]

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[45]Michael Land, questionnaire from author, 1 June 1993.

[46]Halas, op. cit., 78.

[47]Frank Thomas and Ollie Johnson, *Disney Animation: The Illusion of Life* (New York: Abbeville Press, 1984), 156.

[48]Wayne Allwine, telephone interview, 3 Oct. 1994.

[49]Richard Schickel, *The Disney Version: The Life, Times, Art and Commerce of Walt Disney* (New York: Simon and Schuster, 1968), 120.

This practice carried over into later, more sophisticated animation. In the feature film *Pinocchio* the music box sounds in one of the opening scenes were actually performed by an entire orchestra.[50]

Another area where music takes on the functionality of sound effects is imitative instrumentation in live action film. Examples of this are most frequently found in the old Universal horror pictures. These cues could range from flutter-tongue brass to represent a monster's growl, to using a xylophone for rattling bones.[51]

Composer Max Steiner replaced sound effects elements in his music for film. He used clanging doors, bells, hammer blows and engine noises as part of his scores.[52]

Timbral Score (non-traditional instruments)

> A great future probably lies before the combination of sound music and tone music, i.e., acoustic accompaniment of which it cannot be said exactly whether it consists of natural sounds or is achieved by means of instruments....These represent attempts to create a closer union between sound film and music, to admit music as an integral part of the production instead of leaving it as an external appendage.[53]

A timbral score can best be described as a hybrid of music and sound

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[50]Tietyen, op. cit., 60.

[51]William H. Rosar, "Music for the Monsters: Universal Studios Horror Film Scores of the 1930's," *The Quarterly Journal of the Library of Congress* XL, no.4 (Spring 1983): 409-410.

[52]T.J. Ross, *Film and the Liberal Arts* (New York: Holt, Rinehart and Winston, 1970), 225.

[53]Rudolph Arnheim, *Film* (London: Faber and Faber, 1933), 275.

effects, a compositional use of timbres from other sources than traditional musical instruments. These sources can include electronically synthesized timbres, processed instrument timbres, sampled natural sounds–the possibilities are endless.[54]

Environmental ambience can be used as a compositional tool. Typically sound effects such as traffic noise, wind, thunder, and night animal sounds are used to provide ambience, a sense of locale. Music, on the other hand, might provide emotional reinforcement for the events occurring in the same scene. But perhaps a discreet use of sampled environmental textures in the fabric of the score would reinforce the connection between score and image to a greater degree. This could be done subtly, without quoting recognizable source material, or more overtly if there was no direct competition from sound effects tracks. Composer/sound designer Russell Brower included various environmental sounds in his music for *The Living Seas Pavilion* at Walt Disney World's Epcot Center, including sampled whale songs, wine glasses, water bubbles and vocoded voice and white noise.[55]

The use of sound effects as timbral material for scores is becoming fairly common. Composer Dan Wyman has been using sound sampling technology in his compositions for many years, and states that "more and more scenes are scored with sound which is neither sound effect nor music."[56] This type of situation certainly blurs the line between sound

[54]Zettl, op. cit., 347.

[55]Russell Brower, loc. cit.

[56]Dan Wyman, *Scoring for Time,* photocopy, (n.d.), 6.

design and composition. Wyman, in talking about his score for *The Lawnmower Man:*

> I don't see any difference between a sound texture that creates a mood or a good melody that creates a mood....I couldn't imagine using a compositional theme there that would work any better, but certainly that sound was created by a compositional process.[57]

Is the compositional use of timbres and textures based on sound effects less intrusive into the foreground, or more homogenous with the rest of the soundtrack? Certainly the textural cues in *The Lawnmower Man* attract less attention in places than would a more traditional score. Wyman describes a cue for the boardroom scenes that could easily be confused for part of an ambience track, where he used processed noise samples (from various sources including rice and sand rattling in cardboard containers) to create a constantly changing texture.[58]

A technique that would make this process even more symbiotic with the sound effects tracks, would be for the composer to use some of the same source material as the sound designer. The result, if planned carefully, could be a very seamless soundtrack. Hans Zimmer:

> Sometimes I don't want people to know if it's sound effects or music. Of course synthesizers are ideal for that, because I can just steal a sound off the actual soundtrack, manipulate it, and suddenly you don't know what it is.[59]

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[57]Phil Hood, "The Cyber Samples of Lawnmower Man," *E-mu Letter* 5, issue 2 (June 1992): 3.

[58]Dan Wyman, telephone interview with author, 11 Oct. 1994.

[59]Michael Marans, "Hans Zimmer: 'Rain Man' Composer, His Scores Tell What Words And Pictures Can't," *Keyboard* 15, no. 6 (June 1989): 79.

A composer working with traditional orchestral scoring is often challenged to come up with new thematic material and devices to differentiate the last score from the current one. The advantage of working with a palette that contains non-traditional timbres is that it can give each project a customized feel, matching the unique vision of the filmmaker with an equally unique score.[60] There is very little likelihood that a score for an urban film, which features percussive construction noises, would ever be mistaken for a score with processed water bubbles and whale songs.

Sound samplers can also be useful in capturing non-traditional instruments, which may be difficult to find on demand, perform, or keep in tune. Composer James Horner:

> For each film, I tend to make a whole collection of sounds. As for sampling, I tend to sample instruments that I cannot rely on in real life....I've sampled a tremendous amount of medieval instruments in London....I used those medieval hurdy-gurdys along with accordion for some Africa-type music.[61]

Since the primary function of the score is to support the images, it has long been a realm where contemporary (or experimental) music has been able to find a broader audience, and, occasionally even get released on a successful soundtrack album.[62]

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[60]Michael Josephs, "Scoring like Gang Busters," *EQ* 2, issue 6 (Feb.1992): 76.

[61]Mark Dery, "James Horner: Bringing Sound Colors to the Big Screen in Aliens, Commando, and Willow," *Keyboard* 14, no. 7 (July 1988): 62.

[62]Roger Manvell and John Huntley, *The Technique of Film Music* (London: Focal Press, 1957), 154.

Tonal Score (traditional instruments)

> Today you find yourself more and more in healthy competition with the sound effects technicians....I do not seriously think we are in danger, as pure musical sound will always have a wide importance on the films. It is powerfully expressive. It can bring nostalgia to a landscape, drama to any hour of day or night; it can express undercurrents of human emotion, when the actors involved show little of it outwardly. It can suggest what is going to happen, it can recall what has happened; most important of all, perhaps, it can make what has turned dead and dull in a picture come alive and exciting.[63]

The traditional film score usually begins with the opening credits (a sort of film version of throat-clearing, to get the audience's attention focused), winds its way through the plot and under dialogue and recapitulates itself with the closing credits.[64] The contents of the music within this structure ranges widely, from lush romantic music to jazz or rock idioms.

The types of traditional scores are often polarized into two camps: "Mickey-Mouse" and "mood."[65] The former is characterized by catching and amplifying key elements of the action. An extreme example of this is, of course, found in the early Mickey Mouse cartoons (from which the term is derived), where the musical beats synchronize very closely with the action on the screen. A more subtle example is in *Raiders of the Lost Ark,* where an ascending horn line accents Indiana Jones' struggle to

[63]Arthur Bliss, in Manvell, ibid., 210.

[64]Claudia Gorbman, *Unheard Melodies: Narrative Film Music* (Bloomington, Indiana: University of Indiana Press, 1987), 82.

[65]Ross, op. cit., 225.

climb out of the pit in the opening scenes.

The second type, "mood" or "overall" scoring seeks to capture the feel of the film or scene as simply as possible, playing through the action and focusing on other underlying elements.[66] The television series *Twin Peaks* is a good, though extreme, example of this technique, in which a single cue, persistent in its mood, is played with and sometimes against the events in a scene, sometimes to ironic effect.

A third type of scoring, which can potentially combine elements from both of the other types, is a motivic approach. This is the type of score that John Williams excels at, in which a theme is written for main characters, or elements, and is developed and interwoven throughout the entire picture.

In addition to credits and underscoring, a score often contains source music, which can be defined as any music that is "assumed to be audible to the characters in the film."[67] The most common reasons for the presence of source music in a film are: a character is a musician, a character is a performer, the source music is part of the milieu in which the characters appear (such as a dance club or concert hall).[68]

The way source music is woven into the underscoring can sometimes be very effective. Probably the best known example of this is in the film *Casablanca,* where the song "As Time Goes By" is first played in the club

[66]Ibid.

[67]Irene Kahn Atkins, *Source Music in Motion Pictures* (East Brunswick, New Jersey: Associated University Presses, 1983), 13.

[68]Ibid., 21.

as source music, and then is later used by Max Steiner as thematic material throughout the rest of the film.[69] A more subtle, but no less effective use of this source into score transition is found in a scene in *Blade Runner* where Dexter is sitting at the piano, playing one note, remembering (one imagines) the scene that occurred previously where Rachel was playing the piano. After a few repetitions of the note, the score takes over the same pitch and transitions it into underscoring as he moves away from the piano.

The use of songs as part of a score is an area of industry controversy. Often a film soundtrack will be liberally peppered with popular songs for the sake of selling millions of soundtrack albums and increasing the profit margins of an inferior film. More commonly, one will find a single song placed either in a montage sequence, or in the closing credits. Claudia Gorbman states that:

> Song lyrics...threaten to offset the aesthetic balance between music and narrative cinematic representation. The common solution taken by the standard feature film is not to declare songs off limits–for they can give pleasure of their own–but to defer significant action and dialogue during their performance. [70]

Traditional scores can use traditional western instruments in non-traditional ways for mood evocative scoring. Bernard Herrmann was the first to convince Hollywood that strings were not always "warm" in his

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[69]Ibid., 14.

[70]Gorbman, op. cit., 20.

score for *Psycho.* [71] Decades later, James Horner talked about a similar usage in his score for *Aliens:*

> At the beginning of *Aliens,* I wanted to do something...that was icy cold yet very beautiful. I used the strings to give that feeling of deep space–the beauty of it and the absolute coldness of it. It's all strings, all playing without vibrato. That sound of muted violins and violas has the warmth of strings, yet it's very cold and dead-sounding because there's no warmth in their playing. It's a unique color. Later, there are some anvils in there, and some Chinese cymbals.[72]

Thus far the audible soundtrack elements have been discussed. Of equal importance is a discussion of what fills the space between the elements.

Silence

> Silence can be the loudest of noises.[73]

Silence is a tool that can be used by sound designer and composer alike. A composer needs to have an instinct for not only which scenes to score, but which scenes need to play without music. Any frequent visitor to a shopping mall could attest to the fact that constant music eventually gets screened out of our consciousness. It loses all but the most trivial impact. This is as true for "background music" as it is for film underscoring. The

[71]Steven C. Smith, *A Heart at Fire's Center: The Life and Music of Bernard Hermann* (Berkeley, California: University of California Press, 1991), 116.

[72]Dery, op. cit., 62.

[73]Cavalcanti, in Kracauer op. cit., 136.

use of a beautiful theme, which was very effective on the first few listenings, can become tiring and lose impact after too many subsequent hearings. John Williams used the Indiana Jones theme sparingly, but it nonetheless became indelibly connected to the character.

The issue of silence is critical in the work of sound designers, often called upon to pave the soundtrack with layers of effects. Gary Rydstrom discusses the importance of silence, citing the scene in *Terminator 2* where the liquid metal man shatters.

> The moment just before the shatter, all the background noise, so important before, was pulled out so the impact of the shatter was enhanced both by the suspense the silence causes and the contrast in sound levels between silence and the shatter. [74]

The nuclear holocaust scene in *Terminator 2* was also mentioned as an example: Rydstrom said that the best thing in that sequence was how it died to silence after the total devastation.

One reason for the effectiveness of such contrasts may be that we have, to a greater or lesser degree, a sonic memory. Balazs states that the tendency for sound to "echo in our head" longer than a vanished image can be used effectively in contrast with silence.[75] Silence, reciprocally, can perform the equivalent of cleansing the audio palate in preparation of a particularly startling sonic moment.

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[74]Gary Rydstrom, interview with author, 23 Mar. 1993.

[75]Balazs, op. cit., 217.

> Silence, too, is sound and sometimes is a blessing....high points of drama are sometimes prefaced by a moment of silence. The contrast of dead quiet alerts the viewer to the imminence of important dramatic action.[76]

In terms of a soundtrack, silence is usually a relative term. There is a difference, in media and in nature, between absolute silence and perceived silence.[77] When we say it is quiet tonight, we do not mean that there is a total absence of sound, but rather that the sounds we hear are very low in volume relative to normal experience. Only controlled scientific environments can create "an absolute auditory void."[78]

Rydstrom agrees that "silence often isn't really silence, but instead includes quiet, detailed effects we normally wouldn't hear."[79] This idea is expressed eloquently by Bela Balazs:

> We feel the silence when we can hear the most distant sound or the lightest rustle near us. Silence is when the buzzing of a fly on the window-pane fills the whole room with sound and the ticking of a clock smashes time into fragments with sledgehammer blows. The silence is greatest when we can hear very distant sounds in a very large space. The widest space is our own if we can hear right across it and the noise of the alien world reaches us from beyond its boundaries. A completely soundless space on the contrary never appears quite concrete, and quite real to our perception; we feel it to be weightless and unsubstantial, for what we merely see is only a vision. We accept seen space as real only when it contains sounds as well, for these give it the dimension of depth.[80]

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[76]Madsen, op. cit., 311.

[77]Bela Belazs, in Evan William Cameron, ed, *Sound and the Cinema* (Pleasantville, N.Y.: Ridgeville Publishing Co., 1980), 194.

[78]Ibid., 193.

[79]Rydstrom, interview with author, loc. cit.

[80]Balazs, op. cit., 206.

This description of "soundless space" is interesting in a consideration of the film *2001: A Space Odyssey.* The silence of the space environment (and the absence of underscoring) enhances the weightlessness and unreality of the extra-vehicular experience; the amplified sound of the character breathing in his helmet confirms the human empathic response of anxiety to the unearthly surroundings.

There is a "fear of silence" in our society: noise of some sort is a constant companion, whether from piped-in background music, car radios, televisions, or general city sounds. Silence makes most people uncomfortable, makes them clear their throats and try to think of something to say. Because of this, silence is a useful device for building suspense. Rydstrom states that "in nature the silence usually precedes something big, and creates a sense of expectation."[81] His example is the way that animals grow quiet right before an earthquake.
Gary Rydstrom:

> I learned on this film that silence works even for an extended period of time. The biggest challenge was making loud moments loud, at least apparently loud, when a lot of the time you have loud things happening simultaneously and in a row....I love moments like when the Cyberdyne building blows up–when the big explosion...is preceded just by a long period of silence and the click of a detonator.[82]

On the soundtrack, silence can only be communicated *with* sound to a certain degree, since silence in a theater has traditionally meant that the

[81]Rydstrom, interview with author, loc. cit.

[82]Tom Kenny, "Behind the Scenes with the 'Terminator 2' Sound Team," *MIX* 15, no. 9 (September 1991): 116.

audience would become aware of the technology involved (soundtrack hiss, amplifier noise), would be distanced from the film experience, and likely become concerned that the sound system was malfunctioning. To avoid this–again traditionally–noise has always been added to the soundtrack in moments of filmic silence.[83]

Even in the digital domain, with an absence of hiss, true silence is perceived as an unnatural, uncomfortable state. There is still the tendency for the audience to become aware of *themselves* in actual silence, so it is useful only for brief moments of contrast. Generally, because of these factors, a distant dog barking and one lone cricket will be more effective than absolute silence, at drawing the audience into the *experience* of quiet.

Sound designer Randy Thom agrees that digital technology is making silence a more viable tool, but he adds that "directors are still scared that without constant sound the picture won't work."[84] This fear results in requests for over-coverage of the film–wall-to-wall with sound effects, wall-to-wall with music–to ensure that no moment will be without sound when it comes time for the final dubbing session. This does not foster selective creativity in sound design. Neither will every musical cue created under these circumstances have something significant to contribute to the picture, other than as a stop-gap. Nonetheless, it is often still true that:

> When the loud-speaker is silent, when the director cannot think of any necessary sounds, when 'an angel is passing through the room', the musician must step into the breach.[85]

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[83]Zaza, op. cit., 4.

[84]Randy Thom, personal interview with author, 7 Apr. 1993.

[85]Arnheim, op. cit., 274.

CHAPTER 2

Soundtrack Functionality

> The other two elements in a soundtrack–music and sound effects–have separate and distinct functions which are sometimes confused. Both are capable of transmitting factual information in creating an acoustical environment to give the viewer a sense of reality that is in keeping with the visual image. But there is the much more subtle and difficult field of emotional and psychological transmission. In this area music is the leading factor. Sound effects, however, cannot be ruled out in this dramatic area, since they can be used to produce sudden shock, tension, horror, or excitement.[1]

In the early days of radio and film it was easy to to think of sound effects as adding realism ("see a dog, hear a dog"), and music adding emotion–an overly simplistic appraisal. As audio quality has gained in clarity, ambient sound and sound effects have begun to contribute on a more equal footing with music in virtually every area of functionality.[2]

Music does not need to be going full-tilt in order to generate excitement or fear in a scene: sound effects are capable of doing that (as in the T. Rex attack scene in *Jurassic Park*). Likewise, although the emotional element of music sometimes seems paramount, it has numerous other functions that often overlap those of sound effects.

Figure 1 shows potential areas of functionality for music and sound effects , listed top to bottom by most common usage.

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[1]Evan William Cameron, ed., *Sound and the Cinema* (Pleasantville, N.Y.: Ridgeville Publishing Co., 1980), 62.

[2]Roy M. Prendergast, *A Neglected Art: A Critical Study of Music in Films* (New York: New York University Press, 1977), 55.

Figure 1

Functions of Soundtrack Elements

SOUND EFFECTS		MUSIC	
REALISM	Interaction	PSYCHOLOGICAL	Emotion (character)
	Off-screen space		Mood/ ambience
	Locale		Affective states (audience)
PSYCHOLOGICAL	Ambience/ mood	NARRATIVE	Character development
	Affective states (audience)		Story component
	Emotion (character)		Time frame (period music)
MECHANICAL	Continuity	REALISM	Locale
	Filmic devices		Ambience (source music)
	Rhythm		Interaction (sync track)
NARRATIVE	Story component	MECHANICAL	Filmic devices
	Character Identity		Continuity
	Time cues		Pace of scene

The categories in Figure 1 were arrived at by the following process: numerous listings of functionality were extracted from various film resources listed in the bibliography. These lists were cross-referenced and duplicate information was removed. At this stage the list of music functionality was as it appears in the chart. The sound effects list was submitted to several sound designers as part of a questionaire (Appendix A, question 7), for their evaluation of importance or relevance. After collating those results and systematizing the wording, the categories in Figure 1 resulted. Most of the categories are identical for sound effects and music, although the means by which the functionality is achieved differ greatly.

Within the four main category divisions of the preceding chart, the various subcategories will be discussed as they pertain to sounds, music or both.

Psychological

> We cannot understand the role of sound in contemporary cinema without transcending the notion that sound exists solely for audio realism: hearing a door slam when the door closes, hearing a voice speak when the lips move. Although synchronous sound function is important, it is only one aspect of the role of the sound designer in creating an emotional and intellectual ambience for each sequence within a film and for the film as a whole.[3]

The psychological effect of sound is the the most subjective function, and, not coincidentally, it is also the most discussed. In this section we will

[3]Roy Paul Madsen, *Working Cinema: Learning from the Masters* (Belmont, Calif.: Wadsworth Publishing Co., 1990), 289.

investigate the ways in which sound effects and music can manipulate experience and perception, including the affective state of the audience, conveying character emotion and contributing to the mood and ambience of the film.

Affective States (audience)

> Aural experience....is the great conveyer of warnings, incitements, cajoleries, and challenges.[4]

Sound designers have long dreamed of finding the means to control audience response to sound in some quantitative way.[5] Human response to sound is predictable to a certain degree, especially where instincts are involved. For instance, our reaction to sudden loud noise begins when we are born, before we can formulate a conscious understanding of the source.[6] Sound connects on a deep subconscious level.

> Millions of years in the land of mammals have shaped up a superb mobile acoustic warning system; it's simply a matter of finding the handles, and binding them to the most appropriate aspect of a virtual world.[7]

The soundtrack can use this instinctive response to create audience

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[4]James L.Mursell, *The Psychology of Music* (Westport, Connecticut: Greenwood Press, 1964), 20.

[5]ElisabethWeiss and John Belton, eds., *Film Sound: Theory and Practice* (New York: Columbia University Press, 1985), 368.

[6]Ibid, 109.

[7]Howard Rheingold, *Virtual Reality* (New York: Summit Books, 1991), 151.

reactions. The response to certain high frequency sounds such as baby cries, screams or whimpering are innate to the species. Sound in that frequency can elicit immediate instinctive response, whether the source happens to be a siren, or piercing violins. Other sounds, such as a sibilant animal hiss or rattlesnake, can evoke a reaction of "danger" in the listener. Similarly, low-pitched sounds are unconsciously connected with cataclysmic acts of nature–the rumblings of earthquakes, volcanos, tidal waves–and can be used to evoke extreme dread and fear in listener.[8] Loud sound can directly affect our nervous system (heart rate and blood pressure).

> These stress reactions are believed to be an evolutionary holdover from the days when loud sound could mean trouble or danger for our prehistoric ancestors.[9]

Sound also influences us on a more conscious level. We interpret vocalizations in an emotional way, and we also assign emotional content to sounds based on our previous experience of the real world. Specific sounds get interpreted in very individual ways.

> There is such a thing as a "happy" cry as much as there is a "sullen" whisper, a "funny" car crash, and a "frightful" meow. When the audio designer assesses the ways in which the track may manipulate the audience emotionally, it is obvious that mere library prerecordings won't do in most instances where feelings count.[10]

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[8]Tony Zaza, *Audio Design: Sound Recording Techniques for Film and Video* (Englewood Cliffs, New Jersey: Prentice-Hall, 1991), 32.

[9]Stanley R. Alten, *Audio in Media* (Belmont, California: Wadsworth, 1990), 19.

[10]Zaza, op. cit., 16.

Sound is especially powerful because, no matter how often we feel compelled to look away from the screen in horror, what we are hearing is inescapable:

> Sound is a very special modality. We cannot handle it. We cannot push it away. We cannot turn our backs to it. We can close our eyes, hold our noses, withdraw from touch, refuse to taste. We cannot close our ears, though we can partly muffle them. Sound is the least controllable of all sense modalities, and it is this that is the medium of that most intricate of all evolutionary achievements, language...to hear is actually a kind of obedience.[11]

Hearing is the only sense which never shuts off. Hearing is the sentinel which watches over our sleep. A smoke alarm is a necessary safety precaution because the smell of smoke is not enough to rouse us from sleep, but an audible alarm awakens us to consciousness, all of our other senses alerted. The return of smell and sight allows us to take conscious action.

Music also creates a documentable emotional response. People listening to music have been found to show physical responses including changes in blood pressure and pulse rate, similarly to those that occur during extreme emotions.[12]

Sound influences our other sense perceptions, especially vision. Studies were conducted at MIT in which subjects were shown two television sets with identical image quality, but vastly differing audio quality (CD-

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[11]Julian Jaynes, in Tony Zaza, *Audio Design: Sound Recording Techniques for Film and Video* (Englewood Cliffs, New Jersey: Prentice-Hall, 1991), 105.

[12]James L. Mursell, *The Psychology of Music*, 1937, reprint (Westport, Connecticut: Greenwood Press, 1964), 27.

quality sound as versus standard monaural sound). The image quality of the set with better audio was consistently seen as being higher.[13] This gives credence to the observation made by many game producers: that the impression of the graphic qualities improve as soon as sound is added.[14]

A marriage of sound and vision in media makes sense in light of the fact that our brains tend to process sight and sound differently, on parallel channels so to speak, so that we can get the full impression of each without conflict.[15] This means that if the images in a dramatic scene are stirring up certain feelings, the music can slip in on that other "channel" and really bring home the point without distracting us from the drama.

> Music is basically a fantasy, an emotional fantasy. It is for this reason that I think music functions so ideally in the motion picture, because you have in music a tremendous, seductive, manipulative tool.[16]

There is also a deeper psychological significance to our experience of media such as film: they offer us a mirror to reality. The images on the screen are a reflection of life, yet they have no real power over us. They cannot touch us, cannot hurt us. We welcome the images and the accompanying feelings in a way we seldom do in real life, because there is

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[13]Ken Pimentel and Kevin Teixeira, *Virtual Reality: Through the New Looking Glass* (New York: Windcrest, 1993), 72.

[14]Bobby Owsinski, "The Sound of Multimedia," *Film and Video* 11 no. 6 (June 1994), 30.

[15]Pimentel, op. cit., 71.

[16]Elmer Bernstein, in Tony Thomas, *Film Score: The View From the Podium* (New York: A.S. Barnes and Co., 1979), 160.

no real threat to our safety or happiness.[17] In the same way that people scream as they go over the big dip in a roller-coaster, film goers pay to experience a type of "virtual fear" that grisly horror films, or suspense thrillers can give. There is a balancing act that occurs between believing enough to feel the adrenaline rush, without becoming truly afraid. "The willing suspension of disbelief" is central to the entertainment value of media, whether a thriller or a love story; a film or a computer game.[18]

> Neither the designer or the user actually believe the actions on the stage or in the computer are real, but they agree to pretend as if they are real. There's safety in the knowledge that they can escape at any time by leaving the theater or turning off the computer.[19]

A large factor in helping us to reach this state of suspended disbelief is the soundtrack. Music in particular creates a state of suggestibility, which Howard Rheingold calls a "consensual hallucination."[20]

James Mursell compares the effect of music to the state produced by an overdose of adrenaline:

> It is found that no distinct emotion is produced, but that the individual is thrown into a peculiar, unstable excitable condition in which he is very ready to detonate into some specific emotion.[21]

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[17]Brenda Laurel, ed., *Computers as Theater* (Reading, Massachusetts: Addison-Wesley, 1991), 114.

[18]Ibid, 113.

[19]Pimentel, op. cit., 154.

[20]Rheingold, op. cit., 391.

[21]Mursell, op. cit., 37.

The trigger for this emotion could be a visual image, a word, or an association with what is occurring on the screen.

Claudia Gorbman similarly compares music to hypnosis.[22] She states that it overrides the usual defense structures, causing a "lowered threshold of belief, a greater predisposition for the subject to accept the film's pseudo-perceptions as his/her own."[23]

Gorbmann discusses another aspect of music's psychological functionality, which occurs in the type of film she refers to as "spectacle."[24] Spectacle is a film experience that is epic in scope, stories that are bigger than life, sweeping sagas such as *Star Wars:*

> The music playing...invites the spectator to contemplate; it is helping to make a spectacle of the images it accompanies; it lends an epic quality to the diegetic events. It evokes a larger-than-life dimension which, rather than involving us in the narrative, places us in contemplation of it.[25]

In other words, this type of music actually distances the audience from the events on screen, reinforcing the idea that, although the experience may be enjoyable and exciting, it is not *real.*

The presence of music defeats realism. Max Steiner stated that "music would only hurt and interfere" in the case of a realistic film.[26] Jean Gabbert Harrel also states:

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[22]Gorbman, op. cit., 5.
[23]Ibid, 64.
[24]Gorbman, op. cit., 64.
[25]Ibid, 68.
[26]Ibid, 79.

> The addition of music to cinema...makes cinema to that extent unreal. In the real world people and events do not have leitmotifs, nor in other ways is music glued onto them....Of course, in the real world, people attach music to certain specific objects or events, but this connection is accidental.[27]

Joe Herrington, of Walt Disney Imagineering, states that music is "getting put in its place," which is to distance the audience from the experience somewhat, to make it a little less real, a little less threatening. Herrington talks about sound effects and music in virtual reality:

> There are certain times in VR where music is cute and nice and helps set a mood. But there are other parts of VR where you want to say "Hey guys, this is real." And at that time the music just goes away and you do everything you can to make it real. That's where the effects take over and that's where the effects can really do their job. [28]

Music's propensity to convey a dream-like, unreal state is an asset in some cases, a hindrance in others. One would then assume that the exclusion or inclusion of music in a soundtrack would depend upon the intention of the product, whether escapist entertainment or "information environment."

Information environments, like television news programs, are supposed to be emotionless (i.e. objective). Jean Gabbert Harrell states that:

> Addition of music to real events may endow them with an aura, a feeling quality, even a moral attitude that, in "objective" reporting, appear gratuitous.[29]

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[27]Jean Gabbert Harrell, *Soundtracks: A Study of Auditory Perception, Memory and Valuation* (Buffalo, N.Y.: Prometheus Books, 1986), 58.

[28]Joe Herrington, telephone interview with author, 8 Feb. 1994.

Newscasters are intended to be unbiased conduits of information. They are human however, and convey attitude and bias with voice and body cues, making the purported "unbiased report" a myth. Nonetheless, the transition in the mind of viewer from an emotionless information environment to an emotional entertainment environment is generally signified by the inclusion of music. Whereas a news program may use music to lure the viewer back in from the kitchen after a commercial break, the entertainment environment seeks to manipulate experience with its use of sound.

The question of musical inclusion in informational media becomes one of relative impact. An instructional film on the rising crime rate will most likely make the audience's eyes glaze over, but *The Thin Blue Line*–with a score by Phillip Glass–has impact. One then needs to ask: how instructional is something that does not hold our attention? We learn best when our emotions are engaged, when we are immersed in what we are experiencing.

Many computer programs are information environments with practical functionality in which the use of music, and possibly sound effects, would probably be considered to be inappropriate. Laurel states that "appropriateness to the action" should be the criterion upon which a determination is made to include music.[30]

Enter the computer information environment. Ostensibly emotionless,

[29]Harrell, op. cit., 58.

[30]Laurel, *Computers as Theater,* op. cit., 159.

people interact with computers very emotionally. They speak to them, they swear at them. They customize them to make sounds they can connect with on an emotional level. They use art and sound to give meaning to a personal interaction with a non-human object.

Theodore Nelson makes this statement:

> In movie making what are we doing? We are creating an experience on a screen that affects the mind and the heart of the user. What are we doing in interactive software? We're creating an experience on a screen that affects the mind and the heart of the user, plus interaction. What have we lost? What have we relinquished from the movies? Nothing. It's the same thing plus. And this is why I say the proper training for software design is filmmaking. Right now, in the software world, people who have learned to make the program loops go round...think they have the right to bore and intimidate the user to any degree. Whereas the filmmaker must reach the audience.[31]

The criterion for which to assign the need for music in future media such as virtual reality (VR) may be that, as long as technology needs a willing suspension of disbelief on the part of the participant, due to low resolution graphics and slow load times, then music can serve a vital immersive function. The mere presence of a soundtrack can provide a psychological barrier between the immersive experience and the world outside.[32]

However, when virtual reality starts to approach reality, the function of music may change. It may be that when these environments become

[31]Ted Nelson, in Sandra Kay Helsel, ed., *Beyond the Vision: The Technology, Research, and Business of Virtual Reality* (Westport, Connecticut: Meckler, 1992), 171.

[32]Tony Schwartz, *The Responsive Chord* (New York: Anchor Press, 1973), 45-47.

compellingly real–as participants begin adopting the guise of characters instead of passively watching them–that music will be needed to help delineate fantasy from reality.[33] With an appropriate soundtrack, the participant would be enveloped with an assurance of the dream-like quality of the experience; the music in effect becoming a reminder that "this is not real."

Emotion (character)

> To comprehend fully what music does for movies, one should see a picture before the music is added, and again after....Not only are all the dramatic effects heightened, but in many instances the faces, voices, and even the personalities of the players are altered by the music.[34]

The internal mental processes of a character cannot always be communicated in any other way other than through music. Sometimes just a look can move the audience to tears, if it is accompanied by an appropriate upswelling of music. The ability of music to convey emotion is particularly apparent with animated characters, which lack the subtle facial expressions of live actors.

Sound effects are also called upon to convey the character's emotions and reactions in animated cartoons.[35] Robert L. Mott gives this example:

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[33]Myron W. Krueger, *Artificial Reality II* (Reading, Massachusetts: Addison-Wesley, 1991), 264.

[34]Dmitri Tiomkin, in Tony Thomas, *Film Score: The View From the Podium* (New York: A.S. Barnes and Co., 1979), 99.

[35]Robert L. Mott, *Sound Effects: Radio, TV and Film* (Boston: Focal Press, 1990), 82.

> When a character in a cartoon became "boiling" mad or was hit on the head hard enough to hear "birds singing," this is what the audience heard.[36]

There are cultural cliches in music: villain music, love interest music, heroic rescue music–these are types which have carried over from the melodrama, and yet are still being applied to modern films.[37] The villain may not always be apparent from his action: he no longer wears black and no longer has a handle-bar mustache, but the effectiveness of his leitmotif has not changed much since the days when he did (witness Darth Vader's theme in *Star Wars*).

In the early days of film characterization, it was a simple case of "what you see is what you get." No deep ulterior motives were portrayed: villains were villains, heroes wore white hats and were not gnawed by inner doubts. Leonard Rosenman credits Freud's theories about the unconscious for triggering media's interest in the "inner man."[38]

Visible human behavior often conceals deeper motives. In these cases music can make a lie of everything that is seen, and said, on the screen. With the right musical cue, the hero in white can be portrayed as a psychopath. Music gives us insight into what is in the character's mind, even if that seems at odds with his actions.[39]

A subtle use of music to convey inner mental processes often occurs

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[36]Ibid., 83.

[37]Gorbman, op. cit., 34.

[38]Leonard Rosenman, in Tony Thomas, *Film Score: The View From the Podium* (New York: A.S. Barnes and Co., 1979), 237.

[39]Thomas, op. cit., 194.

when a theme is restated, in order to evoke a previous scene or feeling. Jack M. Stein:

> There often occur moments when the immediate expression is influenced by the thought of something lying in the past which continues to have an emotional effect on the speaker. The presence and consequently the influence of this reminiscence can be communicated by the repetition of the characteristic musical line which was part of the original musical expression....It thus appears as a realization and representation of what was just thought of by the character.[40]

Often a theme that is associated with a specific character–a motive–can give a character more depth than is immediately apparent.[41] Another example from *Raiders of the Lost Ark:* when Indiana Jones sets his jaw and we hear a tentative phrase of his theme, we know that, against his better judgement, he is about to do something heroic again. The heroism of the theme plays against his basic nature (which is to avoid trouble and snakes).

A song is often used to communicate a character's inner thoughts. In a musical, the character may sing the song (as in Dorothy wistfully singing "Somewhere Over the Rainbow").[42] More often, a theme song is heard during a montage, or during a particularly emotive and dialogue-free part of a film (the character is staring teary-eyed out of a window, or driving intently along a lonely highway). In this instance, whether the song is in the score or source music, it conveys a general mood of the character rather

[40]Gorbman, op. cit., 28.

[41]Harrell, op. cit., 59.

[42]Zaza, op. cit., 18.

than specific thoughts.

In computer games, music can be used similarly to represent character types not easily communicated by the primitive graphics. Generally this is done through short motivic statements, or musical signifiers.[43]

Rouben Mamoulian describes a scene in one of his films where sound effects were used to a similar purpose: a small vase is knocked to the floor and the sound of a bomb exploding was dubbed in, to convey not the reality of the event, but the inner meaning.[44] A frequently used device in suspense and horror films is a scene in which a character (in a state of high anxiety), jumps at the slightest sound, which has of course been exaggerated for effect.

Mood/Ambience

> Whatever music is applied to a film segment will do something...because the reader/spectator automatically imposes meaning on such combinations....In fact, as long as the general musical style is not completely at odds, whatever the music at the moment, the scene seems to justify it.[45]

Anyone who has ever donned a pair of headphones and popped a cassette into a Walkman can attest to the transformational powers of music on our visual experience. It is not critical that we select the perfect music style to suit the particular stretch of road we are jogging down, any music

[43]Gorbman, op. cit., 83.

[44]Cameron, op. cit., 91.

[45]Gorbman, op. cit., 15-16.

will enhance our experience, make it less tedious. This makes the choice of what type of music to play under a certain scene both easier and more difficult.

The filmmaker or composer may have a very clear and unshakeable vision of what they want to accomplish before running a cue to picture. However, one would suspect that many scenes in films have been taken in new and unplanned directions by the placement of an unexpected musical cue. Often a situation like this can be serendipitous. Siegfried Kracauer tells a story about a drunken pianist of the silent cinema days, who was so absorbed in his own playing that he never looked at the screen to see what images he was supposed to be accompanying:

> Precisely by disregarding the images on the screen, the old pianist caused them to yield many a secret. Yet his unawareness of their presence did not preclude improbable parallels; once in a while his music conformed to the dramatic events with an accuracy which struck me all the more as miraculous since it was entirely unintended.[46]

Gary Rydstrom also talked about the fact that any sound synchronized to picture will work. Rydstrom's example: as a joke, they once put ridiculous sound effects to a piece of film, things like tapping on a table with sticks and dropping silverware, instead of the usual big effects. They expected everyone to laugh at the screening, but the only comment was "it's a little thin."[47]

There is no small amount of debate about music's ability to consistently

[46]Siegfried Kracauer, *Theory of Film* (New York: Oxford University Press, 1960), 137.

[47]Gary Rydstrom, personal interview with author, 23 Mar. 1993.

create a specific mood. However, there seems to be evidence that music can reinforce moods that are already present.

> A musical composition is eminently capable of enforcing a mood or a succession of moods. Indeed, the effect of a composition may be so powerful that the immediately preceding emotional affective state of the listener does not greatly matter....Only when the immediately preceding emotional and affective state is very definite and strong, and sharply in conflict with the prevailing mood of the music being presented, does it constitute a disturbing factor. [48]

Max Schoen states that people more often want music in keeping with their mood than in contrast with it.[49] This is important for film music: if the audience is experiencing and expecting a certain set of emotions and the film music matches those expectations, the combination will be more effective than if the music is playing an emotional counterpoint to the scene.

Source music (music assumed to be audible to the characters) is an exception to this. It is more able to play counter to the scene, seemingly indifferent to the feelings of the character (or the audience for that matter).[50]

> It may suit your dramatic purpose to play against the character of a scene. Source music handles this kind of situation admirably. It succeeds in many instances where scoring fails.[51]

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[48]Mursell, op. cit., 205.

[49]Max Schoen, ed., *The Effects of Music* (Freeport, New York: Books for Libraries Press, 1927), 168.

[50]Gorbman, op. cit., 24.

[51]Earle Hagen, *Scoring for Films: A Complete Text* (U.S.A.: E.D.J. Inc., 1971), 192.

This situation would be more easily accepted by the audience since it is a reflection of every day reality. The deluge of background music we are all exposed to while shopping, driving, etc. rarely reflects our true mood. We have no control over its appropriateness and neither does the character in the film. This in itself would provoke a degree of empathy from the audience.

As a more oblique substantiation: the widespread use of music libraries as source material for media production implies an assumption about the ability of music to evoke predictable emotional responses. Listings in such libraries often have categories such as "happiness" or "sadness."[52] Obviously, a certain established codification must exist or the libraries would not sell, let alone continue to generate work for the people who use them.

Realism

> Your first thought when you see a lot of special effects is that sound's job is to not only do something as fantastical as the visual, but also to make it real. It's not competing with the special visual effect, because people perceive the visual and the sound differently. [Sound designer] Walter Murch had a way of putting it: 'The eyes are the front door, and the ears are the back door.'[53]

It is not difficult to understand how realism became the most obvious function of the soundtrack, given the origins of film in silent cinema. The

[52]Alten op. cit., 336.

[53]Tom Kenny, "Beauty and the Beast: Disney's Latest Looks and Sounds Like the Classic It Is," *MIX* 16, no. 1 (Jan. 1992): 63.

first sound effects coming from the screen were likely viewed as a miracle, and doubtless went a long way towards making the experience closer to life, a little more believable. The same is now true for newer media, such as computer games and virtual reality, since they are struggling with issues of graphic resolution and audio synchronization.

But realism is not just the challenge of sound effects. Music, too, plays a part in making environments more realistic. The most common example of this is the use of source music: the jazz trio playing in the smoky club scene, the organ-grinder on the corner, the songs blasting out of a car radio. All of these things form a part of our real life, and therefore to have them missing from a created reality would damage its credibility.

In this section, various aspects of sound's contribution to verisimilitude in media will be discussed. These contributions include: interaction of character with environment and user with media, creation of off-screen space, locale and general ambience.

Interaction

> The screen is a window through which one sees a virtual world. The challenge is to make that world look real, act real, sound real, feel real.[54]

The concept of the character interaction is most clearly illustrated in animated film. Even the the most sophisticated animation has yet to achieve convincing physicality: without the sound of the footfalls we find it

[54]Ivan Sutherland, in Howard Rheingold, *Virtual Reality* (New York: Summit Books, 1991), 298.

hard to believe the character's feet actually touch the ground–that there is actually ground to touch. If the character moves around in the animated world, walking, falling, running into objects, but making no sound, there is little believability.

This is true in live-action film as well, especially in the case of fantastic scenarios. The *Star Wars* universe is filled with unreal futuristic objects, but George Lucas decided to make everything sound real, to help make his created universe more believable. The sound effects gave verisimilitude to the flimsy sets and miniature worlds.

> The Millennium Falcon's door...first clunks, then hisses, and finally squeaks–all in less than a second. Irvin Kershner so trusted this effect that in *The Empire Strikes Back* he sometimes photographed the opening of a spaceship door by stopping the camera, taking the door out completely, and resuming the action. Burtt's whooshing sounds convinced audiences that the doors had rapidly slid aside.[55]

Music also has a function in interaction: sync tracks–music that is pre-recorded (or, less often, post-recorded), for apparent performance on the screen–are used in a situation where a character performs or plays a musical instrument on the screen.[56] This is typically an ineptly executed piece of soundtrack business, due to a disparity between the audio and visuals, where professionally performed recorded tracks are matched to images of characters awkwardly maneuvering instruments they do not know how to play. The most obvious discrepancies occur with string

[55]Weiss, op. cit., 367.

[56]Fred Karlin and Rayburn Wright, *On the Track: a Guide to Contemporary Film Scoring* (New York: Schirmer Books, 1990), 356.

instruments, such as the violin, where the full vibrato of the source is not physically reflected in the static "performance" of the character. Equally problematic are bowing patterns and techniques. Piano is so difficult to fake convincingly that they usually cut away to the hands of another performer, or avoid showing the hands altogether. These production tracks (of the actual performance on screen) would be a very amusing collection of out-takes! In any event, under these circumstances, the illusion of interaction is shattered.

In computer environments, a causal relationship often exists between the visual events and their audio counterparts. Sonic events must be used consistently and with real-life referents, in order to be understandable to the average user.[57] Apple Computer experimented with a more extensive implementation of audio confirmation of user actions in a project called "Sonic Finder." The sound files used included a metallic clang when a file is dragged into the trash can icon, knocking sounds of various pitches when files are opened, and a whooshing sound when a window is closed.[58] Audible confirmations such as these indicate the successful completion of a task and help to link the computer world with the real world.

> Well-designed auditory interfaces should form a natural extension of existing auditory environments, employing sounds that are distinguishable without being surprising or distracting.[59]

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[57]Laurel, op. cit., 160.

[58]Jonathon Cohen, personal interview with author, 12 July 1993.

[59]Brenda Laurel, ed., *The Art of Human-Computer Interface Design* (Reading, Massachusetts: Addison-Wesley, 1990), 322-323.

The early computer games used sound similarly as a confirmation of user action, in this instance, an animated activity being initiated on the screen. If a character gets hit on the head, there is a "boink." If something explodes there is a "boom." Sound is even more critical in this venue than in standard computer programs, since the low-resolution graphics are often ineffective at conveying complicated events taking place on the screen. To paraphrase the old sound design maxim: in the case of computer games, you may not see that it *is* a dog until you *hear* it.

> When you move a little 3-inch high character around a field of computer screen pixels and make it punch another little 3-inch high character, and watch the opponent fall over, that is one thing. But when you hear the fist crunch and the groan of the adversary, and the thud of hitting the ground, then you are impacting a world and it is reacting to you. Sound effects maintain a spell over the player; they keep him or her inside the world of the game.[60]

Oddly enough, sound had a similar function in early animation. This makes animated film an excellent model for game sound.

> Walt Disney Studios produced their most famous animation classics long before computer animation existed....The principles developed by the Disney animators, who worked without automated assistants, are likely to prove quite useful in interface design....Disney also used sound quite effectively to represent such aspects of events as position, direction, and speed of motion. Sound can be similarly applied to interface events to establish continuity and provide information for the user.[61]

Sound cues can also substitute for other user feedback modalities, such

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[60]Peter McConnell, questionnaire from author, 1 June 1993.

[61]Brenda Laurel, ed., *The Art of Human-Computer Interface Design* (Reading, Massachusetts: Addison-Wesley, 1990), 20.

as touch.[62] Often a sound heard upon bumping into an object in a computer environment will evoke a response similar to actual tactile contact. The author of this paper experienced an example of this while participating in an environment designed as an underwater "virtual aquarium" in which various creatures swam, including a shark. At one point in the experience, an unexpected broadside by a shark was accompanied by a loud "thwap" sound. The instinctive reaction was as if there had been physical contact. In this way, sound can be used instead of complicated kinesthetic interfaces.[63]

With virtual reality, sound becomes one of the most convincing modalities of the created world. Eric Huffman, in talking about one of Virtual World's environments, *Red Planet,* feels that the expert players need acoustic cues to pilot the vehicles (dump trucks on Mars). If the sound stops, they cannot do it anymore.[64]

> VR has world attributes, and sound is one rendering. There is a huge amount of subtlety with what you can do with sound. You can convey heat, speed and direction with filtering, amplitude, envelopes. People tap into sound and make decisions about what to do in an environment.[65]

Audio technology is far ahead of visual technology at this point. Pimentel states that:

> You might be surprised to learn that we're far closer to accurately modeling sound than we are to generating realistic images. It

[62]Pimentel op, cit., 71.

[63]Schwartz, op. cit., 36.

[64]Eric Huffman, telephone interview with author, 13 Sept. 1994.

[65]Ibid.

> might be just a few more years when, closing your eyes, you won't be able to tell the difference between what's real and what isn't.[66]

A future attraction at Disneyland, *Alien Encounter,* was initially conceived as a sound effects only show. The early demonstrations of the show proved to be too terrifying however, and the concept was expanded to include visual components.[67] Joe Herrington, media designer at Walt Disney Imagineering, talking about *Alien Encounter:*

> People are going to see what technology can really do in the way of sound. It's not just this stuff that comes out of speakers. It can be put exactly where it needs to be put and you can believe that anything is happening.[68]

Herrington also states that, due to advances in technology:

> Within the last decade we have proven that sound effects can indeed stand alone, that they can be recorded with the kind of quality to not only create realism, but to transcend realism. And so they're being relied on to do that. For the first time you're beginning to get into experiences where there is no music, there's just an environment and you go "wow! this is magnificent," whether the environment be a night atmosphere or an eerie jungle atmosphere. For the first time the effects can carry it because they're good enough. Now you're seeing more and more stuff like in *Jurassic Park*, where those sounds can be terrorizing enough that you don't need music here to do anything for you. Just let it play.[69]

Herrington predicts that the trend in virtual reality will be towards more and more realism as people want to go somewhere they have not ever been before. He thinks that the sound effects will play a decisive role in making

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[66]Pimentel, op. cit., 123.

[67]Herrington, loc. cit.

[68]Ibid.

[69]Ibid.

that happen.[70]

Recently this author wrote a letter to Gary Rydstrom discussing the change in the relative functionality of music and sound effects because of better audio quality. The point was made that the sound effects only soundtrack in the T. Rex attack scene in *Jurassic Park* would not have had the same emotional impact without the digital frequency response of current theater sound systems. For example: the "impact tremors" would have had very little impact. A similar scene in a movie made decades ago, *The Valley of the Gwangi,* needed frantic underscoring to compensate for a lack of realism in the rest of the sound track.[71] Rydstrom wrote this response:

> You brought up a good point in your last letter about sound effects being able to assume some of the emotional power of music because of technological advances. I agree. Certainly earlier films were limited by the medium. This doesn't mean there weren't good effects jobs–for instance *King Kong* has a great sound track–but instead I think older films necessarily had limited depth and dynamics in their sound effects, which was made up for by music. There was a quote by Danny Elfman in a recent film magazine in which he claims that Dolby stereo was the worst thing that has happened to film scores, because it allowed sound effects to get bigger thus diminishing the once-dominant role of music. I would argue with him, though, that the proper combination of score and effects potentially leads to the most effective tracks. And, alas, in my experience it is often still the score that dominates! [72]

Eric Huffman suggests that a similar use of sound effects, sensually

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[70]Ibid.

[71]Eastman, personal letter to Gary Rydstrom, 23 Sept. 1993.

[72]Rydstrom, personal letter to author, 21 Nov. 1993.

and non-literally, should be the next step in VR. He believes it is possible to create "musicality" with the sound effects.[73] For example: the participant enters a room and the door slams shut. Then a growly tone starts. It portends what the participant is about to find out: that there is an ogre hiding behind the door. An example from real life: one comes home, feeling hassled (behind on projects at work, late in starting dinner, etc.). Then the phone rings. The sound of the phone will be more biting, shrill because of the unwelcome intrusiveness of it. But, if it's a relaxed Sunday afternoon and not much is happening, the phone rings pleasantly since there can be the anticipation of an invitation to do something enjoyable.

If a computer environment can simulate this, it is processing sound effects in real-time, doing the same thing that the sound editors are doing on a cue-by-cue basis for film. Except that in this case, all the parameters for the sound need to be set up interactively. Huffman states that the ideal situation is a "sound stage that executes in real time and makes somewhat artificial decisions about what to do relative to the state of the world."[74]

We have not evolved to interpret sound as anything but accurate. In our world view, visual information may be deceptive (camouflaged and disguised), but sound is not. Dan Wyman suggests:

> Even without sight, we have the emotional impact of a sound which we have heard before–a sound which we believe to *represent* an object or occurrence. Perception of a sound requires belief, or at least belief in context. Sound doesn't carry with it the information "what you hear is a lie."[75]

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[73]Eric Huffman, loc. cit.

[74]Ibid.

[75]Dan Wyman, *Scoring for Time*, photocopy, (n.d.), 13.

Perhaps this is the underlying cause for the reliance on sound effects to communicate realism.

Another facet to our reaction to sound is that we have fairly good sonic recall.[76] We tend to recognize sounds that we have heard before, although we are less capable of deciphering sounds which are new.[77]

This means that a sound functions most effectively when it is familiar, when it can conjure up memory associations in the minds of the audience. This gives credence to the decision to use recognizable animal sounds for the dinosaurs in *Jurassic Park* over more scientifically pure ones. Audiences familiar with Hollywood influenced films had been conditioned by the great numbers of dinosaur and monster movies where beasts made similar frightening roars. If a creature suddenly raised its massive head and let out a resounding chirp, it would have been laughed off the screen, in spite of the film's frequent references to dinosaurs being the ancestors of modern birds. The vocabularies that Rydstrom created, however "unreal" they may be from a scientific perspective, communicated a more realistic *emotional* experience of the creatures.

Randy Thom was asked how he felt about the balance between effect and realism in sound design (see Appendix A: Sound Designer Questionnaire). Thom responded:

> A great lie and the facts accurately stated are equally powerful and beautiful. The problem is that both are nearly impossible to come by.[78]

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[76]Schwartz, op. cit., 27.

[77]Zaza, op. cit., 29.

[78]Randy Thom, personal interview with author, 7 Apr. 1993.

Off-screen Space

Sound effects that are placed in the soundtrack that do not have any visible reference extend the limits of the screen environment into the off-screen space.[79] This is a frequently used function of sound effects, and often source music.

In radio, all sound was in the off-screen space. There was no screen, so everything heard had to be visualized. Sound effects without visuals tend to challenge the audience into imagining a scene or situation that is not really there. This is very useful in media, since it implies that sound can substitute for costly exterior shots, extras, animal performers, just by substituting an appropriate cue.

An example of this would be sound's ability to imply non-existent locations. If we see people sitting in a row of chairs, reading papers, small articles of luggage at their feet, we only know that they are likely in transit. If we add the sounds of an airport in the background–plane engines, P.A. announcements–then we suddenly know they are waiting in an airport. If we add the sounds of a train pulling up into a station, then they are about to get on a train. It was not necessary to use the camera to add the visuals of the train station at that point to convince us. We are used to filling in the gaps with our imagination.

> The audio ought to establish allusions rather than create associations with images, by detaching a sound from its origin

[79]Weiss, op. cit., 193.

> and stimulating the aural imagination through the powers of suggestion inherent in off-screen space.[80]

Sound used in the off-screen space is effective for adding or creating something off scene that is not really there. The footsteps coming up the stairs, the scratching at the door–it is possible to create an entirely menacing character with sound effects alone (which is what they originally intended to do at Disneyland with *Alien Encounters*). Alfred Hitchcock, in talking about his film *The Birds,* gives a vivid illustration of the power of off-screen sound:

> One of the most–to me– satisfying scenes in The Birds is where there are no birds seen at all. You have a room which is boarded up–it comes toward the end of the picture–there are four people in the room...sitting there in silence just waiting for them. I just keep that silence going for quite a bit until the first sounds come, then you begin to hear the attack outside and you don't see the mass of birds at all....to me it's really satisfying because there I threw everything to the audience to use their imagination...[81]

Off-screen sound can also imitate real life by motivating camera movement or cutting to new quadrants of space in the same way that we turn or walk to find out the source of a sound. [82]

In virtual reality, the use of off-screen space becomes critical, even more so because at any given moment the user may choose to make it "on-screen" by changing perspective or location. The environment can still only be seen as a stereo image–we only have two eyes in the front of our

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[80]Zaza, op. cit., 127.

[81]Andrew Sarris, *Interviews with Film Directors* (New York: Bobbs-Merrill, 1967), 204.

[82]Gorbman, op. cit., 25.

head–but the sound can truly be surround and therefore the most realistic experience in the virtual world. For a VR participant, the off-screen space becomes the environment, and sound makes it live. Tony Schwartz states that:

> Auditory acoustic space has no front or back, no above or below, no past or future. And it has no linear directionality. For a listener, sound does not come toward him but is present everywhere in the space he experiences, and it totally saturates his sensory receptors.[83]

Locale

> The nightly barrage of impersonal sounds on city streets is like salty air for the fisherman; it becomes part of our unconscious environment.[84]

In the same way that sound effects can create an imagined off-screen space, they can also lend credibility to the on-screen space, whether in film, computer media or theme park attractions. The frogs, birds, and alligator sounds contribute to the realism of the surroundings in the *Pirates of the Caribbean* attraction at Disneyland. Even in less complex theme park environments, such as the miniature golf course at the Santa Cruz Beach Boardwalk, sound effects enhance the experience.

> A soundtrack that lends realism to the bathysphere is piped throughout the golf course. Depending on where you are on the course you could be hearing the moaning wind through a cave, the sounds of nature, or the creaking of boats tied up to a dock.[85]

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[83]Schwartz, op. cit., 48.

[84]Ibid., 147.

[85]Karen Clark, "Neptune makes a Splash," *Santa Cruz Sentinel* (4 May 1991), D2.

Environmental sound effects, when used to simulate a natural habitat, have been shown to reduce stress in captive (zoo) animals.[86] This gives an interesting perspective to sound design in entertainment contexts. The familiar sound of crickets and frogs on a summer's night should evoke a similar response in the human audience: one of comfort and safety.

The musical score also has a part to play in setting the locale, with ethnic or regional music appropriate to the setting. A score that requires a regional flavor is often accomplished by using folk material. Roger Manvell states that:

> Folk melodies are one of the finest sources of all for film music which must suggest the atmosphere of particular places and peoples. They can be used to enrich every kind of setting from Scotland and Scandinavia to the great regional territories of the United States and Eastern Europe–in every setting, that is, where folk music has become fully established and recognizable.[87]

Scores which utilize this type of material generally supplement it with original material, or use the folk songs as models upon which to structure original themes, or by arranging the folk material in such a way that it bears the composer's stylistic signature.[88]

Generally speaking, though, traditional types of music are avoided in

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[86]David (Rudy) Trubitt, "Focus on Fixed Installations," *MIX* 15, no. 5 (May 1991): 99.

[87]Roger Manvell and John Huntley, *The Technique of Film Music* (London: Focal Press, 1957), 95.

[88]Christopher Palmer and John Gillett, "Film Music," in *Grove's Dictionary of Music and Musicians*, VI, ed. Stanley Sadie (London: Macmillan, 1980), 551.

most Hollywood films. Instead there are standard types of cues for various ethnic and regional types.[89] Gorbmann states that:

> standard film music efficiently establishes historical and geographical setting, and atmosphere, through the high degree of its cultural coding.[90]

There is a difficult balancing act between culturally evocative scoring and scoring for dramatic effect. Franz Waxman avoided use of traditional ethnic music because it would have "detracted from the feeling of the drama."[91] Dmitri Tiomkin describes this viewpoint in more detail:

> I have used the "Indian music" that everyone knows not because I am not resourceful enough to originate other music, but because it is a telegraphic code that audiences recognize. If...the background music takes on that tympani beat the effect on the audience is electrifying. All know the Redmen are on the warpath even before the camera pans to the smoke signals on a distant hilltop. If I introduced genuine, absolutely authentic Indian tribal music, it probably wouldn't have any effect at all.[92]

In this case the approach is even more justified since he is not scoring the picture from the Indian perspective, trying to authenticate their culture, but from the point of view of the settlers. The music that communicates to the audience the impending threat should not be authentic, but emotionalized and westernized. Therefore, the cliche has psychological merit.

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[89]Gorbman, op. cit., 83.

[90]Ibid., 58.

[91]Thomas, op. cit., 55.

[92]T.J.Ross, *Film and the Liberal Arts* (New York: Holt, Rinehart and Winston, 1970), 235.

Ambience (source music)

> Much of what has been said about the modes of synchronization in case of sound proper also holds true of incidental music. The reason is that the latter resembles natural sound in its strong affiliations with the environment. The whistling of the errand-boy belongs among the many noises which fall upon our ear wherever we go; a hurdy-gurdy melody enlivens the street in which it lingers. It is the location of the melody, not its content, which counts. [93]

A created environment would not seem as realistic without varying amounts of random background music. In real life there are usually songs on a radio, downtown street musicians, the drive-by boom of rap music. Film soundtracks, in most cases, seek to emulate this condition

Another instance of music used to create ambience can be found in the Disney theme parks. Disneyland is rife with ambient music. Much of the magical transformation of contrived set into reality is worked by the strategic placement of appropriate musical styles

In Disneyland, there are many layers to the soundtrack: songs that play in the attractions, background music that plays in the different lands, and in the different themed shops. Walt thought of the music for his park as being similar to a film score.[94] Until recently (with the addition of the show *Fantasmic* with its massive towers), this tapestry of music and the technology that created it were as subtle and unseen as film music.

Although Disney is using some of the most sophisticated audio

[93]Kracauer, op. cit., 144.

[94]David J. Fisher, *The Music of Disney: A Legacy in Song* (The Walt Disney Company, 1992), 51.

> systems available, none of the thousands of daily visitors should notice where the sound comes from. The speakers along parade routes should be invisible to passersby, and the background music should be as natural as wind blowing in the trees, a soundtrack in a motion picture, or as Tinkerbell tapping her wand.[95]

These elements of the soundtrack in the park are not source music, however. Disneyland's version of source music comes in the form of "atmosphere groups"–the travelling musicians that perform music appropriate to each land (ragtime piano for Main Street U.S.A., Dixieland jazz in New Orleans Square). Atmosphere groups in Disney parks provide live source music for a live film experience, bringing "music and life to the beautiful architecture." [96]

Mechanical

This section discusses filmic devices (cross-fades, dissolves, etc.). These devices place demands on the soundtrack with issues of pace, rhythm, and continuity.

Filmic Devices

John Huston talks about the intrinsic meaning of filmic devices, which he sees as based upon the way humans tend to see. He describes this

[95]Malcolm Howard, "The EuroDisney Project," *Sound & Communications* 37, no. 5 (May 20,1991): 44.

[96]Anne K. Okey, "Que Le Spectacle Commence!" *Disney News* 27, no. 2 (Spring 1992): 25.

experiment:

> Move your eyes quickly, from an object on one side of the room to an object on the other side....you briefly closed your eyes...Once you know the distance between two objects, you blink instinctively. That's a cut. If you were to pan: passing all the objects on the way, it would become tedious beyond endurance....In the same way almost all the devices of film have a physiological counterpart....Take the dissolve. Your thoughts are changing. There's that moment of impingement of thoughts and images where you are aware of your surroundings, or perhaps looking at something else, outside your direct field of vision. Thoughts change while the things you see intermingle. And take the fade-out: that corresponds to sleep. It's an opportunity to rest, to change completely. Exactly as we use it in film.[97]

This idea of filmic devices having physiological counterparts could also mean that musically, and sonically, the same parallelisms prevail. A film dissolve could be reflected in a musical cross-fade, a fade-out of the picture matching a fade-out in the score.[98] But synchronizing these devices too closely could cause undue emphasis. The fact that a cue lingers over the picture dissolve into the next scene before dying away is useful in reinforcing continuity.

Generally a picture fade-out is reflected in the soundtrack. The television show *Hill Street Blues* attracted attention for having its soundtrack continue past the picture's fade to black before a commercial break–an unusual technique at the time.

It would seem then that these devices and their sonic counterparts are sometimes used in parallel and sometimes in counterpoint. This is a

[97]Sarris, op. cit., 222-223.

[98]Bela Balazs, *Theory of Film* (London: Dennis Dobson, 1952), 217.

choice of either matching or distracting the viewer from the device. In some cases, this is a matter of taste, in others it is more clear. For instance, in film there are numerous abrupt cuts from one scene to the next, often to different locations and times of day. Without some lingering element in the soundtrack to provide continuity, most often the musical score, these would be noticeably jarring events.[99]

Another device in film is called "point of view" (POV), which is most simply described as the perspective a particular shot (camera angle and positioning) gives the audience. Again this visual device has a parallel in the audio realm, such as the relationship between close-ups and the close miking of sounds, long-shots and distant miking.[100] Thus sounds can be recorded with this visual space perception in mind. Walter Murch:

> Perspective in sound is a surprisingly powerful tool that enhances realism and conducts emotions. I like to think that I not only record a sound, but the space between me and the sound: The subject that generates the sound is merely what causes the surrounding space to resonate, like the string and the body of a violin.[101]

Another subtle use of auditory POV, is to use it in contrast to the picture, as in the instance of sound calling attention to a small but significant object in the scene (like a distant ticking clock) that normally might be drowned out by the noise around it.[102] This has been used to good dramatic effect.

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[99]Zaza, op. cit., 282.

[100]Rudolph Arnheim, *Film* (London: Faber and Faber, 1933), 221.

[101]Walter Murch, in Roy Paul Madsen, *Working Cinema: Learning from the Masters* (Belmont, Calif.: Wadsworth Publishing Co., 1990), 294.

[102]Balazs, op. cit., 210

Film is not the only media that can suffer from awkward transitions. This is even more of an issue in dealing with computer games. Because of the interactive nature of games–events created and processed in real time–often the player will experience delays during changes from one segment to the next, while the computer gets the necessary new data. These are termed "load times." Brian Coburn, of Sega:

> On *Jurassic* we spent a lot of time trying to cover loads. Trying to make the experience kind of seamless. How good a job we did, I'm not sure. On the levels we play music, and then in between the levels when you're transitioning trying to get the disk to load the data, we had MIDI sequences and FM instruments that were in RAM and could play and cover that transition.[103]

This is similar to what film music does in covering transitions. A common one is the passage of time, when a caption says "New York, 1948." What happened during that transition was the music played a little "time passing" kind of cue. In film, the cliche is showing the pages of a calendar blowing by. No matter how it is represented visually, the music usually has to be there, lasting into the next scene.

The degree to which filmic devices like fades and cuts will be utilized in virtual reality is still an area of speculation. An argument in favor of their use is that, as an audience, we are already "trained" to accept them. On the other hand, in a three dimensional environment they could be disorienting and intrusive.[104]

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[103]Brian Coburn, telephone interview with author, 27 July 1994.

[104]Pimentel, op. cit., 153.

Continuity

> [The composer's] contribution is to give a certain smoothness of continuity to a medium which by its very nature is jumpy and choppy.[105]

In early animation, continuity was achieved by the simple device of rhythmic pulse. Tietyen, speaking of the film *Snow White,* states that "every action in the film is built around a musical beat."[106]

> Now Disney was forced by the rhythmic patterns of music to orchestrate this movement more carefully. Instead of being a series of random effects, the cartoon achieved through music more solid structure than it had been possible to acquire from an unadorned story line.[107]

In later more sophisticated films (such as *Pinocchio*) that were no longer structured rhythmically, the score was still a critical element in providing cohesion. In this case, the device used was that of character motives, reappearing in scenes throughout the film.[108] However the score may be constructed, music is generally a significant link in these films.

> Music constantly underpins, glues together, punctuates the cartoon film....Dialogue and sound effects are non-continuous elements; music is seldom absent, though it may withdraw momentarily in favor of these other elements.[109]

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[105]Hagen, op. cit., 156.

[106]David Tietyen, *The Musical World of Walt Disney* (Milwaukee, Wisconsin: Hal Leonard Publishing, 1990), 40.

[107]Richard Schickel, *The Disney Version: The Life, Times, Art and Commerce of Walt Disney* (New York: Simon and Schuster, 1968), 131.

[108]Tietyen, op. cit., 61.

[109]John Halas and Roger Manvell, *The Technique of Film Animation* (New York: Hastings House, 1959), 169.

In live-action film, musical themes make a substantial contribution to continuity by being recurrent, evolving entities. Any of John Williams' scores are wonderful examples of how a few themes can be restated and seamlessly interwoven in a score. Also, theme songs are frequently used during a film montage, which would otherwise be a disjointed series of cuts between visual elements.[110]

A common device with the dialogue track is to begin with a shot of the speaker and then cut away to various other reaction shots while the dialogue track continues uninterrupted.[111] Sound effects are used to bridge cuts within a scene in the same way. An example: the sound of a storm raging outside the house can give continuity to cuts to scenes in different rooms (which may in actuality be different sets). The sound effects track can eliminate the need to constantly define location. Sound can also replace images to eliminate cluttering cut-aways, as in the case of a door slam and engine noise indicating a character has gotten into a car.[112]

Rudolf Arnheim was concerned, in 1933, about what "stereoscopic" film would do to the illusion of continuity that film, with its frequent cuts, only precariously communicates. He felt that, in the new medium, cuts would cause "an absurd succession of the most disjointed spacial positions."[113] Perhaps it is true, as Arnheim warned, that what is tolerated in two dimensions would not be in three.

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[110]Zaza, op. cit., 18.

[111]Ibid., 125.

[112]Kracauer, op. cit., 130.

[113]Arnheim, op. cit., 238.

Immersive environments may necessitate a more transitional flow to changes in landscape, scene, and circumstances. The soundtrack, which traditionally plays across physical cuts in a flat film image and contains background ambience which often begins before or continues beyond a scene, could play an important part in VR continuity. In the real physical world we are not instantaneously transported from one place to another. Perhaps a musical score in VR could enhance the experience of changing scenery in much the same way that it soothes the harried commuter.

Rhythm

A musical pulse is often used in animation. The music is pre-recorded and influences all the rhythmic choices in the scenes that are created afterwards.

In live-action film, the issue of rhythm is applicable as well, in this case it involves the editing rhythm, the pulse created by the various shot and scene changes. Music also frequently has an influence here, by way of the use of temp tracks.

Temp (or temporary) tracks, are musical selections, usually from other sources than what will be ultimately end up in the film. They are spliced together to give the filmmaker, editor, studio executives and investors an idea of how the picture will work when done. Often these tracks are laid in before editing the picture, to provide cohesiveness to the process.[114]

[114]Karlin, op. cit., 39-42.

A composer is often not happy about temp tracks for various reasons. The first is that these tracks are often presented as a sort of template for the work that is expected, thereby confining creativity to a certain structure, especially in terms of rhythm and tempo. John Williams was presented with such a temp track for his work in *Raiders of the Lost Ark,* which he used as the basis for his score.[115]

Temp tracks can also set up a false expectations about the capabilities of the composer in circumstances of limited time, limited resources, and limited writing styles. A famous example of this is the instance in which Walt Disney, intent on communicating the type of music he wanted for *Bambi,* played the Pastoral Symphony cue from *Fantasia* for musician Ed Plumb. Frank Thomas describes the rest of the scene:

> When it was over, Walt turned and said, "There Ed, that's what I want. Something big! See the difference?"
> Ed's look was part shock, part disbelief, and part pleading. "But Walt–that's Beethoven!"
> Walt responded, "Yeah...?" and waited to hear some reason why Ed could not write the same sort of thing. It was no more than he asked of his whole staff day after day.[116]

The other reason that composers do not like temp tracks is that the filmmaker may become so enamored of them that nothing else will do. Composer Alex North had his score for *2001* thrown out in favor of Stanley Kubrick's choice of temp tracks.[117] Alex North got a type of posthumous revenge, since Jerry Goldsmith recently recorded North's score for *2001* for

[115]Ben Burtt, personal interview, 28 Apr. 1993.

[116]Frank Thomas and Ollie Johnson, *Disney Animation: The Illusion of Life* (New York: Abbeville Press, 1984), 145.

[117]Karlin, op. cit., 44.

release on CD.[118]

Pace of Scene

> Music...demands the absorption of the whole of our time-consciousness; our own continuity must be lost in that of the sound to which we listen....Our very life is measured by rhythm: by our breathing, by our heartbeats. These are all irrelevant, their meaning is in abeyance, so long as time is music.[119]

In keeping with the previous discussion about temp tracks, the following illustrates how music can influence pace. Editor John Burnett:

> You can have a scene that's running very long and *should* be long. If the director is very honest, and he keeps running it over and over...pretty soon he feels it's just too long, and he starts going, 'Cut it, cut it.' Until finally it becomes not even an entity within itself that's worth anything....But all of a sudden you put in a piece of music, and...they start saying, 'Wait a minute,that's too short.'[120]

A filmmaker's prime objective is to hold the audience's attention. John Huston states that:

> Two or three seconds of delay in a scene in a film can immediately cause a dull and laborious effect, and the viewer can begin to behold himself, rather than the screen. He shifts in his seat and coughs and scratches and feels his internal organs at work....It's a requirement of film-making that the viewer's attention be held all the time.[121]

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[118]Blair Jackson, "Recording the Lost Score for 2001: A Space Odyssey," *MIX* 18, no. 1 (Jan. 1994): 81.

[119]Langer, op. cit., 110.

[120]Karlin, op. cit., 38-39.

[121]John Huston, in Sarris, op. cit., 222-223.

Depending upon the style, music can appear to make a scene move more quickly, or it can slow it down.[122] It can help in the area of keeping the interest of the audience, and, as mentioned before, provide continuity to faster editing tempos such as those found in *Star Wars.*

Narrative

The narrative potential of sound in media is frequently used to good effect. Both music and sound effects can be used to manipulate audience expectations and communicate story elements.

Story Component

> If I had to settle for the use of just one word to describe the function of scoring, I think I would choose "portend." Film is full of portents–things which are suggested or implied by the mood of the script, the acting, the direction, and the photography. I feel music can serve that purpose probably better than the other elements...[123]

A vivid example of music's ability to portend is the two note theme that announces (or falsely indicates) the shark's arrival in *Jaws.* Decades later, in a similar Spielberg film, *Jurassic Park,* the frightening creature was a tyrannosaurus rex, and its arrival was announced by impact tremors–sound effects this time, instead of music. These two examples illustrate the contribution both elements can make to the story.

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[122]Thomas, op. cit., 143.

[123]Jerry Fielding, in Thomas, op. cit., 215.

Sound effects can extend beyond the obvious realism into the creation of reality. Ben Burtt's work on *Star Wars* illustrates this in the many instances where the sound effects created a feeling of life where there actually was none, in everything from creatures to contraptions.[124] In the section on realism (earlier in this chapter), an example was given about the use of sound effects to create the impression of a sliding door on the Millennium Falcon. This is not an unusual application.

> So telling is sound that an entire story may be implied through the conceptual presentation of sounds over an image on the screen that is essentially static.[125]

It is a common device to put the sound of a machine in operation to an image of a stage prop (as in the sound of a dishwasher in a kitchen that is not functional). Carrying that technique a little further, one arrives at a dishwasher that not only runs, but it growls ominously, or digests small pets in its inner recesses–sound effects can tell any story.

Sound effects and music can also help to focus attention on a key point in the narrative. A sound-producing object can physically direct our eyeline to the location of the source.[126] This is an important function in interactive media, providing another facet to the user interface. An example is the enticing music cue echoing up from the manhole cover in the opening screen of Cyan's CD-ROM product *The Manhole.* This audio element draws the players attention to that object as a means to enter the underground world below. It could be used similarly to lead a player

[124]Weiss, op. cit., 367.

[125]Madsen, op. cit., 289.

[126]Zaza, op. cit., 27.

through key plot points.

A vital narrative function of music is to replace unnecessary dialogue. Music alone can convey a series of character emotions that would eliminate the need for verbal explanation. This was done to great effect in *Bambi*.

> As with all Disney's work, music and sound played a major part in making Bambi the sublime artistic construct it is. The music in particular provided the answer to the excessive verbosity inherent in Salten's novel, the characters of which are developed chiefly by means of sophisticated dialogue. Responding to the first draft of *Bambi*'s screenplay, which totaled five thousand words, Disney felt that 'the characters talk too much. In the book it's different, [but] we're working with a medium that calls for action, so let's cut the unnecessary conversation.'[127]

There are many instances where music is used to similar effect in live-action film, including the recognition scene in *Vertigo* which plays with just music, no sound effects or dialogue.[128]

Songs are frequently used to replace dialogue and contribute to the story development in film. Disney has used song as a structural element since the beginning, and this continues to recent films such as *The Lion King*.

> It was Disney's objective that the songs would either offer exposition, develop characters and situations, or advance the plot rather than be music interludes randomly inserted in the film.[129]

To that end, many of the Disney Studio's recent animated films have enlisted the talents of composer Alan Menken and lyricist Howard

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[127]Ross B. Care, "Threads of Melody: The Evolution of a Major Film Score--Walt Disney's Bambi," *The Quarterly Journal of the Library of Congress* XL, no.2 (Spring 1983): 80.

[128]Cameron, op. cit., 120.

[129]Tietyen, op. cit., 37.

Ashman. Their involvement from the early story stages allowed a significant narrative contribution to be made by the lyrical and emotive content of the songs. Menken describes the priorities of writing for this genre:

> Always get the story right first. Always know that when you write a song, you have got to make the character move, either physically or emotionally or mentally, from point A to point B. It's very important in musical theater that songs further the plot. Always choose moments that are peak moments.[130]

The technique can be very effective. An example comes from *Beauty and the Beast:* the lyrics of the first song introduce characters, locale, and communicate Belle's dreams and frustrations–all of which would have been very boring and time consuming if told in dialogue form.[131] The following quote about the animated film *Jungle Book* sums up the power of song:

> It's impossible to imagine this telling of the story without the songs which define the characters and the freewheeling spirit of the film.[132]

Song in animatronics attractions such as *Pirates of the Caribbean* performs a similar function, more critical perhaps since the visual images are so fleeting and the "actors" are incapable of conveying anything but a

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[130]Bill Demain, "Disney's Music Man: Alan Menken," *Songtalk* 3, issue 1 (n.d.): 19.

[131]Jim Fanning, "Beauty and the Beast." *Disney News* 26, no. 4 (Fall 1991): 19.

[132]Mr. Bonzai, "Richard and Robert Sherman: Brothers in Song," *Disney Channel Magazine* 10, no. 3 (May/June/July 1992): 26.

characterization of an emotion. The soundtracks for these attractions contain narration, dialogue, sound effects, and underscoring in various combinations, but they also are mostly song-driven.

> And then, of course, there were the songs. As in a musical motion picture, they would be an integral part of the Disneyland experience, advancing and in some cases even telling the story that goes along with an attraction.[133]

When Randy Thom states that the primary function of sound effects is "manufacturing ambiguity." He went on to say that he thinks "the greatest thing any work of art can aspire to do is to ask a fascinating question."[134] Later, in an interview, Thom elaborated on this statement:

> Sound design is storytelling. And great storytelling is not so much what you say, as what you leave out. This causes the listener to draw on his own psyche. Ambiguous image does this: why is an element in shadow, why this unusual camera angle? If the image is done with an element of ambiguity, the sound designer can use that. The hardest shots to put sound to are flat, static, normally lit–what is the POV of that? What does the image say that isn't immediately apparent? Usually nothing.[135]

This author then described to him the scenes in *The Haunting* where moldings in the rooms were shot in shadow, changing slightly so that a face could suddenly be seen that was not at first apparent, and then something that might be laughter is heard, seeming to come from the mouth. Thom agreed that is a good example of the "ambiguity" he is talking about. In the case of *The Haunting,* this ambiguity is a critical

[133]Fisher, op. cit., 51.

[134]Randy Thom, questionnaire from author, 3 April 1993.

[135]Randy Thom, personal interview, 7 Apr. 1993.

story component.

An inability to accurately identify sonic events can be used to good effect in developing the narrative.

> One hardly ever attends to any sound without the question, either explicit or implicit: "What is that?" And if one cannot tell, one is likely to continue listening and puzzling uneasily for some time.[136]

A mysterious sound requires attention and heightens suspense while the aural mystery is being solved; an easily identified sound can be quickly dismissed as the listener moves on to other events. Sound effects have long been used to evoke terror in "horror" films: Is that the wind moaning or a hideous creature in the attic? Is that a board settling or a footfall on the stairs? For one with an active imagination, jumping to the worst possible conclusion is usually effortless. It is in pushing a more level-headed person over that same precipice that music can be useful. If that creak is accompanied by high dissonant strings, it reinforces the feeling that something bad is indeed about to happen.

> But noises have this quality–they do not inevitably suggest what made them. This means that certain types of noise can be used "incognito." [137]

The ambiguity of hearing is actually taken advantage of by modern post-production, as well as traditional theater. The Foley stage is full of "sounds like, but isn't" treatments. Some of these sound more like the original than the original, due to recording anomalies. However, the other

[136]Mursell, op. cit., 58.

[137]Weiss, op. cit., 108.

issue at work here may not be one exclusively of poor sonic identification. Because the bulk of scientific research in this area was done before computers and digital sound, it may be that a reported inability to recognize a specific sound had more to do with poor audio quality in the test cases.[138] This raises the question of whether a dropped bag of sand is accepted as a substitute for a body fall through growing accustomed to inaccurate sound reproduction, or because of suspension of disbelief?

Wayne Allwine thinks that the old thunder sheets and rain machines used in early sound film not only are not believable *now*, but were not believable *then.* [139] He thinks they never fooled anyone, although some Foley effects were more accurate than others. So perhaps this falls under the auspice of consensual hallucination: the audience agreed to believe it was thunder, because to not do so would minimize their enjoyment of the experience.

Character Development/Identity

In a previous section we discussed the use of motives in conveying a character's emotion. Such motives can be as simple as those in "Peter and the Wolf"–just snippets of melody to announce the approach of a character. This is the way motives are generally used in computer games (Michael Land cited the example of a character whose appearance in a game is

[138]Stephen Handel, *Listening: An Introduction to the Perception of Auditory Events* (Cambridge, Massachusetts: MIT Press, 1989), 220.

[139]Wayne Allwine, telephone interview with author, 13 Sept. 1994.

always announced by the addition of a hi-hat part into the MIDI score).[140]

Usually in film though, a character's theme is more fully developed. A theme can evolve over the course of the story–gaining more strength, becoming more minor and psychotic–in any number of musical directions. Changing treatments of the theme convey the inner emotional life of a character, the mood matching the circumstances.

Often the theme evolves parallel to a character's development. *Raiders of the Lost Ark* provides another example of this: the theme for our reluctant hero, Indiana Jones, is very briefly stated in the beginning of the film, and gains a little assertiveness during more heroic moments later in the story, but is never actually stated fully until the closing credits.

Character identity can be enhanced in media by the use of sound effects as signifiers–analogous to musical motifs. These signifiers can be used to keep characters straight if they cannot really be seen, as in the case of a characteristic car engine, whose arrival informs the audience of who just drove up without need for further explanation.[141]

Time Cues

Sound effects are often called upon to give the audience time cues, which avoids the need for excessive explanation, or frequent shots of clock faces. An example of this would be the "rooster crow at dawn" cue for

[140]Michael Land and Peter McConnell, personal interview with author, 25 Mar. 1993.

[141]Steve Barnett, "Film Sound Editing Techniques," *Recording Engineer/Producer* 13, no.1 (Feb. 1982): 66.

country scenes, or "garbage truck noise in the street" for urban scenes to signify early morning. Similarly, crickets are used to convey the idea of evening when a scene is indoors and the time may not be otherwise apparent.

Another more subtle use of sound cues occurs when the mere presence of an acoustic event signifies time is passing. For instance, in a scene with much dramatic tension such as two people haltingly trying to communicate, an occasional dog barking, or the incessant ticking of a clock might communicate the heavy presence of time.

Time Frame (period music)

The original *Star Trek* series presented an interesting problem: several episodes were set in worlds that duplicated periods in earth's history. These episodes required appropriate musical treatment, in styles ranging from Baroque to Irish Folk. Given the tight production schedule of a television series, these cues most often had to be assigned to various composers who could handle the required style easily.[142]

These instances were for source music cues however, which usually is only required to represent the period accurately. An entire score for a period film is a different situation, and can be a difficult balancing act for the composer. Composer Miklos Rozsa, who scored a number of historic

[142]Fred Steiner, "Keeping Score of the Scores: Music for Star Trek," *The Quarterly Journal of the Library of Congress* XL, no.3 (Winter 1983): 8.

films, summarizes the considerations of the stylistic approach:

> I think that the musical score should fit in with the style created by the period of the picture. When the utmost stylistic care is taken in the production of a period piece...I think that the musical score should not destroy this unity by introducing...a completely foreign element. It has to be stylized, as the very nature of dramatic music excludes the verbatim usage of music of periods, which were utterly undramatic: but with the melodic, rhythmic and harmonic elements of the past, the modern composer can create a dramatic language of his own, which fits the style of the screen-drama.[143]

The romantic idiom is the style most frequently used with film, from the silent era to the present, from Steiner to Williams.[144] One can begin to understand the reason by reading this description of romantic music:

> Its material–ordered sound and rhythm–is almost completely detached from the concrete world of objects, and this very detachment makes music most apt at suggesting the flood of impressions, thought, and feelings which is the proper domain of romantic art....Only instrumental music–pure music free from the burden of words–can perfectly attain this goal of communicating emotion.[145]

If the primary function of music in media is to evoke an emotional response, or to communicate emotion, then a score in the romantic style is ideal. Any deviation from this style, say to the jazz or rock idiom, risks losing a certain emotional range, a certain codified response. Even more

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[143]Manvell, op. cit., 113

[144]William H. Rosar, "Music for the Monsters: Universal Studios Horror Film Scores of the 1930's," *The Quarterly Journal of the Library of Congress* XL, no.4 (Spring 1983): 403.

[145]Donald Jay Grout, *A History of Western Music* 3rd ed. (New York: W.W. Norton, 1980), 551-552.

drastic would be the effects of a film scored with baroque music, since it can hardly be construed as emotive. Composer Hans J. Salter describes this situation:

> We recorded music of the period...laid it behind the film, with regard for scenes but as a kind of mood. We used flutes, harpsichord, viola de gambas [sic], and other old instruments. It was a good idea, but it didn't work. The preview audience didn't respond to it, and the studio executives were puzzled by the sound. Our score was dumped....It taught us to stay in line.[146]

A compromise needs to be reached between a purely stylistic score and a purely traditional (romantic) one. A composer needs to suggest the period style without trying to create an imitation of it–no matter how accurate the imitation may be–with a score that best serves the drama.[147]

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[146]Hans J. Salter, in Thomas, op. cit., 110.

[147]Palmer, op. cit., 551.

CHAPTER 3

Soundtrack Interaction

> The vocation of the sound film is to redeem us from the chaos of shapeless noise by accepting it as expression, as significance, as meaning.[1]

In Chapter One, the main components of the soundtrack were discussed as well as shadings which sometimes make the division into isolated categories problematic. Similarly, element interactivity is complicated by varying degrees of blurred definitions and overlapping functionality. Before examining sound effects and music interaction, the subject of dialogue needs to be examined more closely.

Dialogue is generally not present unless it is there to convey information. The information is important for the audience (user, player or participant) to hear, or it would likely have not been included. Therefore, the most critical soundtrack issue, except in rare cases where artistic choice may dictate otherwise, is to keep the dialogue intelligible.

Film composers have many solutions for accomplishing this goal. Obviously the easiest choice is to adopt the policy of early sound film and simply play the dialogue scenes without music. This is not a practical alternative however, since music can substantially contribute to the psychological impact of such scenes, as was discussed in the previous chapter. The usual practice is to modify the orchestration to work around and under the dialogue. Too often, if this is not done by the composer,

[1]Bela Balazs, *Theory of Film* (London: Dennis Dobson, 1952), 198.

music cues end up getting pulled down in dubbing, which does not guarantee the intelligibility of dialogue and also diminishes the effect of the music.[2] Good writing is the solution, not altering the balance between elements by "ducking" (automatically lowering) the music when the dialogue parts come in.

The best analogy for working with dialogue, sound effects, and music is that of counterpoint composition:

> The theory of musical composition termed counterpoint suggests that musical lines not overlap in frequency, so that one line cannot capture the elements of the other line.[3]

This has been translated into soundtrack terms most simply by stating that the dialogue track is the soloist, and that the other two elements need to support it, without interfering with each other.[4] Orchestral instrument ranges are arranged in families of frequency ranges (for example the strings with low to high ranges being represented by the contrabass, cello, viola and violin). Since the frequency of human speech usually falls in the middle of the musical range, a hole in the score will need to be created by eliminating instruments in the same range (i.e. soprano, bass, etc.).[5] Of course the situation becomes much more complex when persons with

[2]John Halas and Roger Manvell *The Technique of Film Animation* (New York: Hastings House, 1959), 239.

[3]Stephen Handel, *Listening: An Introduction to the Perception of Auditory Events* (Cambridge, Massachusetts: MIT Press, 1989), 215.

[4]Alfred Newman, in Earle Hagen, *Scoring for Films: A Complete Text* (U.S.A.: E.D.J. Inc., 1971), 160.

[5]Handel, op. cit., 464.

different vocal ranges are speaking together. To complicate the situation further, there is the fact that many of the sound effects will likely fall in the same frequency range (a train whistle might conflict with the violas for example, or a telephone ring with a piccolo line).[6]

The big problem with the counterpoint approach is that the sound effects and music are usually created simultaneously, in relative isolation, which makes any attempt to work with or around each other unlikely.

However, there are still some general guidelines for insuring the most successful merging of the three elements. In terms of music, one important guideline is keeping the texture of the orchestration light and simple.[7] Fred Karlin also lists five guidelines for underscoring dialogue, beginning with a discussion about voice-overs being more difficult to understand than dialogue, and therefore needing more caution. The remaining considerations are: use smooth textures, since they are less intrusive, underscore out of the vocal range, avoid distracting accents and solos, avoid extreme highs and lows, and avoid overwriting.[8]

In the area of sound effects, the issue becomes one of selecting carefully what elements fall in the foreground and background of the soundtrack. Obviously, again, when dialogue is present it must be in the foreground. However:

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[6]Stanley R. Alten, *Audio in Media* (Belmont, California: Wadsworth, 1990), inside back cover.

[7]Roger Manvell and John Huntley, *The Technique of Film Music* (London: Focal Press, 1957), 207.

[8]Fred Karlin and Rayburn Wright, *On the Track: a Guide to Contemporary Film Scoring* (New York: Schirmer Books, 1990), 132.

> The absence of dialogue activates the mind to listen to other sounds. Those background sounds normally pushed back by the conscious mind come forward and are listened to when there are not spoken words.[9]

The challenge then is one of constantly changing focus: shifting important elements in and out of the foreground, leaving room for the dialogue.

Figure 2 lists five potential types of interaction between music and sound effects (SFX): competition, augmentation, substitution, redundancy and autonomy. These categories will be discussed in more detail in the following pages.

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[9]Roy Paul Madsen, *Working Cinema: Learning from the Masters* (Belmont, Calif.: Wadsworth Publishing Co., 1990), 305.

Figure 2:

Interaction of Soundtrack Elements

INTERACTION	DESCRIPTION
COMPETITION	SFX and Music in same range
AUGMENTATION	Complementary function or range
SUBSTITUTION	Music as SFX or SFX as music
REDUNDANCY	Both make the same statement
AUTONOMY	Each assigned a different function

Competition

> Why, since colour, tones, words, pictures, were selected, should not sounds be similarly treated? There is no need to hear all the doors bang and every character breathe....Selectiveness must be exercised.[10]

Competition between sound effects and music can occur on two different levels. The first falls under the general heading of psychoacoustics, which can be defined as "the subjective effect sound has on those who hear it."[11] The second level is that of the various functionalities

[10]Rudolph Arnheim, *Film* (London: Faber and Faber, 1933), 253.

[11]Alten p.31

discussed in the previous chapter (psychological, realism, etc.). There are several key psychoacoustic issues for avoiding sonic competition.

> The range of an individual's acoustic impressions is a variable of his psychological condition....a cry for help will keep us from registering the noises of the cars and buses before our eyes. But what if the traffic noises are nevertheless inserted? Such excess sounds occur in many a film. Parallelism handled mechanically runs the risk of falsifying reality as we experience it.[12]

We tend to perceive sound subjectively, tuning in to some sounds, tuning out others. The film experience can imitate this natural way of hearing by creating periods of relative silence, where we are focused on the dialogue, or moments of dramatic isolation of sound, when we are focused on some unusual event, such as a scream.[13] This rendering of selective sonic environment is the sound designer's challenge. A frequent question asked of Gary Rydstrom is "how many sound effects tracks were going all at the same time?" His response is:

> I won't even answer that anymore because it's not the point. I'll read an article and someone will say "we had 500 sound effects going at once." But if that were true you don't have articulated effects at all, you have pink noise. The art is to select what is important and focus our attention on those sounds over the course of the scene.[14]

The sparing use of sound effects in *The Haunting* made as much of a contribution to the mood of the film as did the stark camera angles.

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[12]Rene Clair, in Siegfried Kracauer, *Theory of Film* (New York: Oxford University Press, 1960), 129.

[13]Ibid., 139.

[14]Gary Rydstrom, personal interview with author, 23 Mar. 1993.

Fortunately there are hearing "anomalies" that are exploitable in the context of selectivity.

One of these hearing characteristics is our tendency to intermittently stop attending to a low level background sound.[15] This means that such an element can be pulled out when necessary without creating an unnatural experience. The most regular sounds (ocean waves, traffic hum) are assimilated into our sonic environment and then largely ignored. Inconstant sounds (faucet drips, dog barks) engage our attention at each appearance, and are therefore more distracting and annoying. These two factors can be put to good use in creating ambient backgrounds: the comfort of a continuous hum, or the jarring effect of random alterations of sound and silence.

Another useful auditory phenomenon is described in the following:

> Events in the real world overlap and "compete." The acoustic energy from one event may be masked or obliterated by louder sounds or noises....Given this occurrence, the perceptual system must infer whether the event has truly ceased, or whether the noise has "hidden" a continuing event; in the latter case the perceptual system must judge what the missing part of the event was. The context leads to knowledge and expectations about the ongoing events in the environment, and it is this context that leads the listener to expect one signal and not another. If the "masked" acoustic signal at a point tends to suggest that the event did occur, listeners will "hear through" the noise to perceive a signal that possibly did not occur. This has been termed auditory restoration or auditory induction.[16]

A better description of this trait would be "persistence of hearing,"

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[15]James L. Mursell, *The Psychology of Music,* 1937, reprint (Westport, Connecticut: Greenwood Press, 1964), 156.

[16]Handel, op. cit., 209.

analogous to persistence of vision.[17] This is an important concept in understanding why radio sound people found it effective to introduce an ambient sound, such as rain, at the beginning of a scene, and then, as the dialogue begins to hold the listeners' attention, slowly fade it out, and then back up at the end of the dialogue scene. The rain is still assumed to continue throughout the scene without causing intelligibility problems with the dialogue (which would have been considerable with radio).

A useful approach for avoiding over-saturation of the soundtrack with elements that the listener might not even notice are missing may well be found in the radio sound effects tradition. However, certain conditions need to be avoided or the persistence of hearing illusion is shattered, including: the sound ending just before the masking sound begins, changes of amplitude in the sound before masking begins, and the sound not reappearing on the other side of the masking sound (i.e. at the point that the masking sound is finished).[18]

In the area of functionality, the ways that sound effects and music can be in competition with each other can be seen as a matter of intent, not content. Consider the example of a scene in which footfalls are heard coming up the stairs in a dark, lonely house. The sound designer has put effort into creating a series of ominous wood creaks, changing reverberation characteristics as the steps come closer to the bedroom door. During the same scene however, the composer wrote music with a high string line, a low ominous drone, and occasional sharp percussive hits.

[17]Alten, op. cit., 558.

[18]Handel, op. cit., 212.

These events would be in competition sonically since the subtleties of both approaches are being masked by the other. They would be in competition functionally because they are both trying to create a psychological effect: to produce suspense in the audience and to convey the character's anxiety.

Augmentation

> You just need to give the audience a break. I think the intelligent filmmaker knows that and works with those dynamics, and allows moments of quiet and allows sound effects to take a scene, or just quiet dialogue, and just use the music where you really need it.[19]

Complex soundtracks can potentially contain complex sound layers without it becoming an issue of competition. The ways in which this can be achieved are discussed in this section, again divided into the areas of psychoacoustics and functionality.

The importance of using silence as a contrasting element in a soundtrack was discussed in Chapter One. This is an important consideration in creating a complex texture of sound effects and music that will work to augment and not compete with each other. Tony Schwartz states that we need to evaluate the volume of a sound in terms of its context. He gives the following examples:

> A bottle, shattering as it hits a garbage can, will not ordinarily startle us if a diesel truck has just passed. The same bottle, shattering on a quiet street at night, will affect us quite differently. A telephone ring does not usually startle us, but it can if we are concentrating on a faint scratching sound in a nearby wall where

[19]Mark Mangini, telephone interview with author, 22 Sept. 1994.

> we suspect a mouse is building a home. Volume is also relative to acoustic setting....volume can be reduced or amplified by competition with other sounds.[20]

This is a good point for sound design and composition alike. Continued periods of loudness lose effectiveness, sonically and emotionally.[21] The most common area of competition is where both elements are blasting away in a mistaken attempt to produce excitement. When the sound effects are created with periods of silence and dynamic contrast, and the music is recorded with a broad dynamic level (especially if those level changes reflect the needs of other elements such as dialogue and sound effects), then the whole soundtrack can work as a type of mosaic, with each element able to clearly convey its information.

Localization of sound can also be an important tool for getting a complex soundtrack to have impact. A good sound system (such as a THX theater, or a surround-sound simulation like the Convolvotron) can be a medium's greatest strength, since we hear 360 degrees around us, but can only see from 50 to 120 degrees in front of us.[22]

Humans have a fairly accurate ability to localize sound sources. Normally, when we hear a sound source, we will tend to turn our head in such a way as to center the energy equally between our ears. This gives us

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[20]Tony Schwartz, *The Responsive Chord* (New York: Anchor Press, 1973), 29.

[21]Evan William Cameron, ed., *Sound and the Cinema* (Pleasantville, N.Y.: Ridgeville Publishing Co., 1980), 63.

[22]Tony Zaza, *Audio Design: Sound Recording Techniques for Film and Video* (Englewood Cliffs, New Jersey: Prentice-Hall, 1991), 189.

the visual location of the sound. The exception to this process is when a sound is very faint, in which case we may turn our most sensitive ear towards it in order to capture the most energy possible (an example of this can be seen when people say "pardon me?" and turn their heads to better hear the missed word or phrase repeated).[23]

For this reason, surround sound in theaters can sometimes be distracting: there is the occasional urge to turn to identify the sound source, which of course moves the eyes out of visual range of the screen and spoils the illusion. This seems to happen more often with isolated elements in the surround (like a rooster crowing somewhere off to the right) and less often with constant ambience textures (like rain or ocean waves) which we can eventually tune out. Because of this, surround sound is more effective in virtual reality, where turning the head to localize the sound can actually bring the source of the sound into the field of vision. Unfortunately, this may also mean that off-screen sound will have to be used fairly selectively in VR since there may be an expectancy on the part of the participant to be able to find the source.

We are also fairly adept at differentiating audio streams emanating from different sources.[24] This trait is most often termed the "cocktail party effect," and is illustrated by stating that we are able to consciously tune in and out of overheard conversations at a party, whereas a microphone would simply hear an anonymous crowd murmur. Part of this effect is so that we can select the important sound in our environment (such as a predator

[23]Mursell, op. cit., 59.

[24]Alan Belkin, "Orchestration, Perception, and Musical Time: A Composer's View,"*Computer Music Journal* 12, no.2 (Summer 1988): 51.

roaming nearby) and screen out the unimportant sounds (wind, human chatter).[25] The reason that our hearing is able to do what the microphone cannot is described as follows:

> Difference in perceived location is one of the major bases for stream segregation....It is considerably harder to follow one conversation if the localization information is eliminated–that is if all the sound is recorded and played back through one speaker.[26]

This is why the complicated soundtrack of *Pirates of the Caribbean* works. Each speaker is source localized to the character "delivering" the line of dialogue, or prop "making" the sound effect. The background ambience comes from elsewhere, as does the music, so stream segregation can occur as the listener passes by.

Sound effects and music, when used carefully in the ways described here and elsewhere, can duplicate functionality and yet augment each other. A short but clear example of this is in *Jurassic Park,* where the characters have stopped to gawk at the giant brachiosaur grazing on the tree tops. The music is communicating, as John Williams put it, "a sense of the awe you'd feel seeing those magnificent creatures."[27] The cue culminates in a large orchestra swell and final chord hit as the creature drops back down to all four legs. At the same time there is a thunderous boom that communicates the full impact of the weight of the creature, and

[25]Madsen, op. cit., 289.

[26]Handel, op. cit., 189.

[27]Jeanne Wolf, "John Williams Scored 'Em," *TV Guide* 41, no. 27 (July 3, 1993): 29.

reverberates in the surrounding space. Although the elements share the same sonic moment, and are communicating the same information (size, majesty, a feeling of awe), they work perfectly to enhance each other, partly due to the use of space in the theater. There are many similar instances in *Jurassic Park* (which will be discussed in Chapter Five).

An example of sound effects and music augmenting each other is found in the Mickey Mouse cartoon short *Hawaiian Holiday.* This cartoon dates from the days of the Disney studio (1938) when they had moved past doing exclusively musical sound effects (see the next section) and had begun to add touches of studio sound effects. In this cartoon, there is a scene where a large ocean wave is rolling in. The initial sound of the wave is Foleyed, using an old vaudeville surf and rain machine. When the wave crests, a cymbal crash, which is part of the musical score, catches the event. The Foley surf subsides as the wave washes up on the beach. Then a musical phrase imitates the water receding from the beach. The result is a funny, yet effective way of capturing the cartoon-like reality, with each element contributing to convey the events in a more believable way.

Substitution

> Recording of noises has done away with program music. The musical reproduction of a storm cannot compete with the recording of a real storm.[28]

Early Disney cartoons used musical cues instead of sound effects

[28]Hanns Eisler, *Composing for the Films,* 1947, reprint (Plain View, N.Y.: Books for Libraries Press, 1971), 103.

(cymbal crashes for waves, slide whistles for leaps, pizzicato strings for footfalls). Initially this was done for reasons of expediency–it being the easiest way to synchronize all the elements. Later, sound effects were created in the studio using various evocative devices. Eventually the availability of relatively inexpensive recording equipment led to the usual modern process, which is to go out into the field and record natural sound for later use or processing. At the point where this became standard operating procedure, the days of programmatic, sound-evocative scores, were largely over.

One can still find instances of music used as sound effects in more recent live-action film. *The Haunting* uses a blaring horn section as a horse rears and percussion hits for a cane rapping against a wall. But generally, this use of music has diminished to the point where it is not fashionable any longer. In contemporary instances where the underscore Mickey-Mouses a cue, such as Indiana Jones climbing out of the pit in the opening sequence of *Raiders of the Lost Ark,* the sound effects and Foley are usually doing the same thing.

Occasionally, there will be a sequence in a film where sound effects are given a role traditionally occupied by music, which is to create a psychological effect, such as the "city jungle" scene in *Apocalypse Now* and the "T. Rex" attack in *Jurassic Park.* These sequences usually represent a significant showcase for sound effects, and at least in terms of the usual process, a substitution of elements (sound effects for music).

Redundancy

> The greater part of modern theatre music suffers from the mistake of seeking to repeat the scenes passing on the stage, instead of fulfilling its own proper mission of interpreting the soul-states of the persons represented....The storm is visible and audible without aid from music; it is the invisible and inaudible, the spiritual processes of the personages portrayed, which music should render intelligible.[29]

Composer Buddy Baker told this author a story about being asked to write a musical cue for an avalanche scene. Baker protested that no-one would be able to hear it, but the director was firm in his request. At the dubbing session, they pulled the cue out because it could not be heard over the avalanche.[30] The director was unnecessarily concerned that a natural disaster would not be exciting without duplicating the excitement in a score. Potential examples of this type of redundancy exist in many film productions, particularly in the action genre, where car chase scenes have loud crashes, explosions, while music frantically attempts to accomplish something underneath it all. Redundancy can be also be found in comedy.

> Music can create funny effects, but not by trying to sound funny. It must do it by making comment. The biggest mistake is to play comedy music against funny dialogue. It just eats itself up. It's a waste of effort. You can accentuate something by calling attention to the fact that it is funny, and you can sometimes play straight music against comedy.[31]

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[29]Ferruccio Busoni, in Claude Debussy, Ferruccio Busoni and Charles Ives, *Three Classics in the Aesthetics of Music* (New York: Dover, 1962), 83.

[30]Buddy Baker, telephone interview with author, 28 July 1994.

[31]Bronislau Kaper, in Frank Thomas and Ollie Johnson, *Disney Animation: The Illusion of Life* (New York: Abbeville Press, 1984), 122.

Early comedies are filled with these moments however, as are many cartoons. *The Simpsons* is an example of an animated comedy that avoids redundancy precisely by not scoring comedically. Alf Clausen:

> I've been scoring *The Simpsons* very much as I would a live action drama. That involves not being so cutesy or Mickey Mousey, but rather trying to really probe the emotions of the characters as opposed to the actions.....something in comedy becomes funnier when it's accompanied by real-life dramatic music, as opposed to commenting on silliness with silly music.[32]

Autonomy

The instances where autonomy (no overlapping of sound effects and music functionality) occurs are few and far between. It requires either careful forethought and planning or a very stylized project. The clearest example of this is *The Haunting* (discussed in Chapter Five) which keeps the sound effects elements and musical elements separated both in time and in functionality. In most cases, however, since sound effects are used throughout a film, autonomy is most often found in a split of functionality.

This type of autonomy is illustrated by the soundtrack for *Star Wars*. The sound effects contribute to making the imaginary universe sound real (as discussed in Chapter Two). The score, on the other hand, was intended not to reflect the space-like images on the screen, but to be emotionally evocative. George Lucas placed music by Dvorak and Wagner on a temp

[32]Greg Rule, "Inside the Simpsons," *Keyboard* 19, no. 1 (Jan. 1993): 45.

track before his meeting with composer John Williams, stressing that he wanted a "nineteenth century classical sound." His reasoning is reported by Williams as being that:

> We were going to see planets unseen, creatures we hadn't met before. Everything visual was going to be unfamiliar, and that, therefore, what should be familiar was the emotional connection that the film has through the ear to the viscera. This I have to credit George with, the idea of making the music, as the composer would say, solidly tonal and clearly melodic, acoustic rather than electronic.[33]

Therefore, while the sound effects are contributing to the realism of the sets, the environment and the action, the music in *Star Wars* is performing emotive functions for the characters and the audience.

In *Twin Peaks,* the music in some scenes played against the drama so much that it had quite a different functionality, most notably in the diner scene where the juke box source music is playing. Another clearer example from television was the Fox series *Parker Lewis,* a half-hour comedy loosely modelled on the film *Ferris Bueller's Day Off.* In the show, the music was relegated to the role of playing scene transitions with very short musical hits–a stylistic statement, but largely used just mechanically to bridge shots. The sound effects, on the other hand contributed to the audience effect, communicated the emotional viewpoint of the main character, by being very unrealistically exaggerated. The principal, for instance, when gesturing for Parker to come into her office after some wrong-doing had been discovered, made a movement with her

[33]Charles Champlin, *George Lucas: The Creative Impulse* (New York: Harry N. Abrams, 1992), 49.

thumb, accompanied by a sharp "whoosh," not unlike the sound a whip makes without the "crack." This was reflecting the character's perception of the situation in a comedic way.

The Soundtrack Score

> We are...confronted with the paradoxical situation that one of the chief tasks of sound film is to avoid sounds. Sounds can only be a serviceable art medium when their appearance is motivated but not when they are present in chaotic abundance. To avoid this abundance without interference with reality–to plan sound-film scenes...so that they quite naturally only contain those sounds that are essential–will require the whole art and craft of gifted film [persons].[34]

In this chapter many issues that effect the success or failure of a soundtrack have been discussed. There are an overwhelming number of variables involved in every decision for sound effects and music alike. Generally, these decisions will be based upon issues of judgement, taste, expediency, or outside control. The one issue that needs to be addressed however, is that of how to plan a soundtrack if two key elements are being created in exile. One possible solution, requiring the intervention of a mediator versed in the creation of both elements, would be to prepare a soundtrack score for critical or complicated scenes.

Precedents for such a score has already been set, particularly in the area of animated film. Composer Francis Chagrin describes his method for organizing dialogue, sound effects and musical elements in a scene:

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[34]Arnheim, op. cit., 255.

> I gave each syllable of the very witty text a time value, as if I had been going to set it to music, and then divided the whole text into bar-lines. The action was intimately bound up with the text, and for special emphasis I introduced bars or beats of rest, where the spoken word would give way to some special effect. There were, in addition, also passages of pure action...during which no words were used. The final score looked as if it had been written for a solo singer with orchestral accompaniment.[35]

Composer Barend Ross uses a similar system for notating his scores for animation, using a central staff for key points in action so he can leave space for effects.[36] A score was also used by Jimmy MacDonald:

> First, he would score his effects on a music staff, each note denoting the duration of a sound and each note annotated to indicate its identity or source....he more often than not would work just like a radio soundman...performing his effects directly to the projected image.[37]

Figure 3 is a template for this type of score. In the case of feature film, the number of staves for key sound effects might be greater. In the case of a CD-ROM, the number of staves for both sound effects and music might be less. The sound effects would be notated in terms of placement, pitch and duration (where relevant). Events of indeterminate pitch would be assigned general frequency ranges (using treble or bass clefs). The instrument staves would be used for a sketch of key musical events. The top and middle staves are used to note significant dialogue and scene/action cues.

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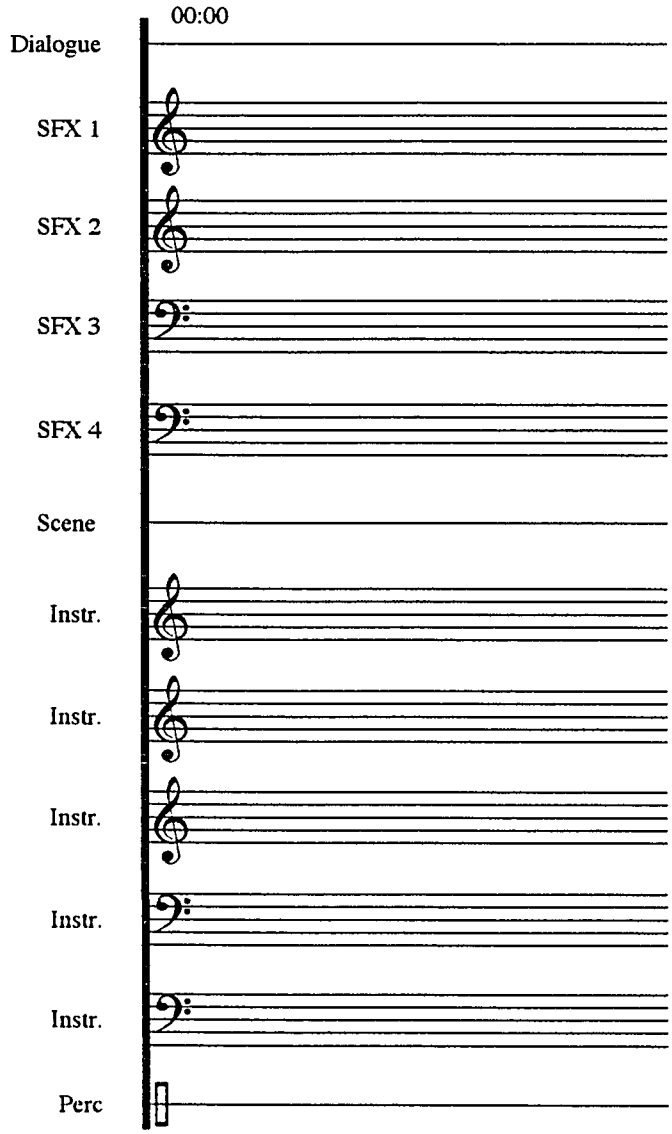
[35]Francis Chagrin, in John Halas and Roger Manvell, *The Technique of Film Animation* (New York: Hastings House, 1959), 239-240.

[36]Barend Ross, personal interview with author, 14 Nov. 1992.

[37]Elisabeth Weiss and John Belton, eds., *Film Sound: Theory and Practice* (New York: Columbia University Press, 1985), 364.

Figure 3

Soundtrack Score Template



In many cases, such a detailed analysis of a scene would not be necessary; good communication between the composer and sound designer would suffice. However, in the case of a difficult scene, such as the raptors in the kitchen in *Jurassic Park* where music and sound effects elements both need to be clearly heard, a system like this might be of great help.

An alternate approach, for less complex soundtracks typically found in computer media, might be a diagram such as the one shown in Figure 4. The designation of certain areas as sound effects only, dialogue, or musical montage would be clearly shown, as well as areas of potential competition.

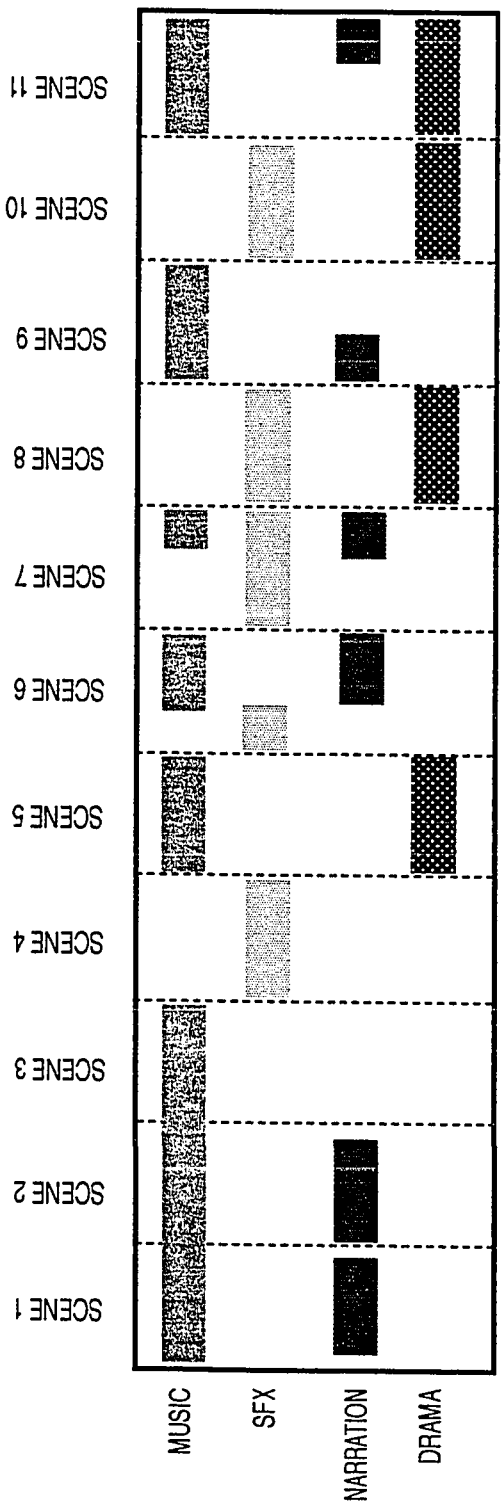


Figure 4

Soundtrack Diagram Template

CHAPTER 4

The Media Continuum

> The recapitulation of previous forms seems to be as intrinsic to the evolution of media as it is to the development of human individuals in the womb. Human embryos have gills and tails before they assume uniquely human shape; television emulated theatre, vaudeville, radio, and film. The emergence of a new medium is a dance between the evolutionary pattern or recapitulation and the force of new creative visions.[1]

The development of new media does not occur in a vacuum. Although new technological developments can appear to generate entirely new art forms, the differences in content between the old forms and the new are only superficial. This is particularly true of entertainment media. The newer and older forms have a common underlying element: cultural functionality. The needs and desires of the audience do not change with each change in technology; new forms of media must continue to appeal to the audience on a fundamental psychological level in order to gain mass acceptance. In this respect the hardware involved is transparent.

> An interactive computer system is a series of presentations intended to affect the mind in a certain way, just like a movie. This is not a casual analogy; this is the central issue. I use the term "virtual" in its traditional sense, an opposite of "real." The *reality* of a movie includes how the scenery was painted and where the actors were repositioned between shots, but who cares? The *virtuality* of the movie is *what seems to be in it.* The *reality* of an interactive system includes its data structure and what language it's programmed in–but again, who cares? The important concern is, *what does it seem to be*?...And to create

[1]Brenda Laurel, *Computers as Theater* (Reading, Massachusetts: Addison-Wesley, 1991), 193.

> this seeming, as an integrated whole, is the true task of designing and implementing the virtuality. This is as true for a movie as for a word processor.[2]

There is little essential difference between media in their effect on the audience/participant, although implementations are diverse. Therefore, the soundtrack–critical to producing this effect–should also be considered unilaterally for all media. If the psychological elements remain consistent (people laugh, people cry, people relate), the creative approach should as well.

Because of this element of commonality, different forms of media have similar content. This can be illustrated most simply by the fact that films are still being made of Shakespeare's plays, even though, technologically and chronologically, live theater and the celluloid world of film have little in common. However this is not an isolated example:

> Telephone communication was filled with "telegrams." Print was filled with talk. Movies were based on books, plays, and scripts. Television was filled with movies. Records were filled with performances, and radio was filled with records. Even today, many of these media are used in the old way.[3]

In this chapter a continuum of reiterative forms, from theater to virtual reality, will be examined for similarities in content and function of the soundtrack. In doing so, a general basis will be established for applying analysis of sound functionality across different media.

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[2]Howard Rheingold, *Virtual Reality* (N.Y.: Summit Books, 1991), 177.

[3]Tony Schwartz, *The Responsive Chord* (N.Y.: Anchor Press, 1973), 80.

Theater

Brenda Laurel uses the model of theater in her approach to computer environments. In doing so, she focuses on the cultural significance of human interaction with the media, rather than the media itself. It is Laurel's theory that empathy with the actions or the actors is necessary for the experience to fulfill its cultural purpose:

> Theater is a psychological process that uses language, rhythm, voice, myth, and perception-altering technologies to achieve a specific state of mind in the audience. Aristotle said catharsis was a healthy and necessary way for people to deal with the great themes of life and death. The means by which catharsis is induced in an audience is the emotional simulation capability that enables humans to empathize with the actors...and internalize the dramas.[4]

In live theater, the empathic response is perhaps easier to elicit than in more technologically sophisticated forms. Real human beings are on the stage, and, if they are good at their craft, they are experiencing and conveying emotions. Only a small amount of physical space separates the audience from the actors, and from the other audience members, enhancing the empathic response. In addition, the theater environment provides a three-dimensional (3-D) experience that could include other stimuli than visual or auditory. Max Schoen gives this example from opera:

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[4]Rheingold, op. cit., 304.

> Instances of non-auditory responses to the presentation of music are not restricted to vision. The mouldy stage smell, the burning incense in the oriental scene...are not without effect upon our response...[5]

Live theater has always had the ability to become a type of sensorama (a performance which engages our olfactory, visual, and auditory senses). This same approach is used in Disney's theme park attractions, where images, sounds, and smells are all used to give a simulated reality verisimilitude. But, however immediate and evocative theater has historically proven to be, the empathic response of the audience becomes more problematic when varying amounts of technology are interposed between the art and the audience.

Radio

Radio is frequently termed the "theater of the mind." [6] Radio is unique among the media being discussed here in that it has no accompanying visuals. Instead, sound was used to evoke imagery in the listeners' minds. A collection of actors, sound effects people, and musicians, were in the studio, following scripts and scores, but at home the audience heard characters arguing, thunder and rain, or gunshots. The "mind's eye" filled in the faces and the surrounding details.

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[5]Max Schoen, *The Effects of Music* (Freeport, New York: Books for Libraries Press, 1927), 247.

[6]Stanley R. Alten, *Audio in Media* (Belmont, California: Wadsworth, 1990), 267.

The importance of radio in the continuum is best judged by the impact it had upon the technologies that followed it, especially film and television. As Hollywood increased production of sound film, many of the sound personnel from radio came to work in the new medium.[7] In addition, at least one influential film composer, Bernard Herrmann, came from a background of scoring radio drama, and used what he referred to as "radio scoring" in his early work for film.[8] In this way, the structure and work methodology of film sound were heavily influenced by practices established in radio.

In a film soundtrack, there was no longer the need for a pictorial use of sound; the audience could now actually see the objects on the screen. However, one remnant from the days of radio–a connecting link between the use of sound in radio and film–is the use of sound to create an illusion of off-screen space. If there is a suitable amount of city racket in the off-screen space, a bedroom scene filmed on a Hollywood set can seem like an apartment in New York. This is a technique used consistently in film.

In some ways the legacy of radio inhibited the newer art form of film. The literal interpretation of sound cues in radio led to a static interpretation of the potential of sound effects in film. This approach, described earlier as "see a dog, hear a dog," means that anything visible on the screen needs to

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[7]Evan William Cameron, ed., *Sound and the Cinema* (Pleasantville, N.Y.: Ridgeville Publishing, 1980), 199.

[8]Steven C. Smith, *A Heart at Fire's Center: The Life and Music of Bernard Hermann* (Berkeley, California: University of California Press, 1991), 77.

make a corresponding noise.[9] In radio, of course, it was more a case of "hear a dog, see a dog," at least from the audience's perspective, since if there was no sound cue for the dog, it would not live in the mind of the listener. In film these same sound effects people would tend to make a dog bark, even though it just happened to be running by in the background and was not strictly necessary for the plot development. This particular philosophy of sound editing can still be seen in recent films.

Another crippling legacy from radio is the concept of spatialization of sound in a movie theater. In radio, the sound was one dimensional, emanating from a single point source and played with limited dynamics due to the limitations of the technology.[10]

It was decades before theaters moved past that center-screen speaker limitation, and started to fully utilize the larger area that modern theater sound can fill. Today, in a Dolby or THX surround-sound theater, the image may still be restricted to two-dimensions in front of the viewer, but the sound comes from the front, sides, and rear with incredible realism.

Film

The film soundtrack has undergone decades of evolution, beginning in the years of silent film. The fact is that "silent" film was, at least from the

[9]Jeff Forlenza and Terri Stone, eds., *Sound for Picture: An Inside Look at Audio Production for Film and Television* (Emeryville, CA: Mix Books, 1993), v.

[10]Cameron, op. cit., 199.

audience perspective, anything but silent. Cameron states that:

> ...there never was such a thing as a silent film...From the earliest days...theaters featured a variety of sounds in more or less synchronous accompaniment to the images which appeared on their screens. These included music, sound effects, and speech, and they were produced at each individual theater on a custom basis.[11]

Often complex instruments were used to create the necessary musical cues, as well as sound effects, ranging from galloping horses to the blowing of noses.[12] In other words, the live accompaniment to these "silent" films really had much in common with radio sound: live effects on cue, and music to fill up the gaps in dialogue, which, in the case of silent film, were continuous.

The transition from silent film to sound film was not without controversy. Spoken dialogue was an obvious improvement over images with captions, as were sound effects predictably synchronized to the action on the screen.

> To hear music coming from a film was nothing new–it had always been there–but to hear a door slam or two people carrying on a conversation were aural pyrotechnics with which music clearly interfered.[13]

Music became the area of difficulty for early film soundtracks. Philosophies on how music should be used ranged from limiting it to just opening and closing credits, to playing it as a constant background, thereby

[11]Ibid., 3.

[12]Ibid., 4.

[13]Roy M. Prendergast, *A Neglected Art: A Critical Study of Music in Films* (New York: New York University Press, 1977), 24.

perpetuating the silent film tradition.[14] Some of the issues that made the use of music problematic were debates on whether the presence of music made sense if there were no musicians in the scene, and to what extent the presence of music interfered with dialogue:

> The outcome of this debate was that, aside from main and end titles, there was very little music in most early sound films...Universal was one of several studios whose policy was to have no music under dialogue since it was felt that music interfered with it.[15]

However, this situation rapidly changed. Within a few years music was once again an expected element in the film experience; within a decade, film scoring was becoming a specialized art.[16]

Animation

> Disney was the first movie maker to resolve the aesthetically disruptive fight between sight and sound through the simple method of fusion.[17]

One of the earliest uses of the new technology of sound film was the Disney cartoon, *Steamboat Willie.* The Disney studio showed extreme

[14]Christopher Palmer and John Gillett, "Film Music," in *Grove's Dictionary of Music and Musicians*, VI, ed. Stanley Sadie (London: Macmillan, 1980), 549.

[15]William H. Rosar, "Music for the Monsters: Universal Studios Horror Film Scores of the 1930's," *The Quarterly Journal of the Library of Congress* XL, no. 4 (Spring 1983): 391-392.

[16]Palmer, op. cit., 549.

[17]Richard Schickel, *The Disney Version: The Life, Times, Art and Commerce of Walt Disney* (New York: Simon and Schuster, 1968), 131.

resourcefulness in meeting the challenges of synchronizing animated images to a rhythmic music soundtrack. Many of the techniques developed with that first project continued to be used in the film industry for decades, such as the click track.[18]

In an interesting way, live theater, specifically vaudeville, also had an impact on the treatment of sound effects and music in early film and radio. Jimmy MacDonald began doing sound effects for Disney animation in 1934. His approach was very similar to that of radio, performing live cues as the film was shown.[19] MacDonald was adept at finding and modifying the type of sound-producing contraptions used in vaudeville, creating a non-literal approach to sound effects still used today.

> A lot of the machines he had–some of them he designed–but a lot of them came out of vaudeville. He was not above buying vaudeville props. We had in our backroom a stage wind machine, a canvas with an uneven barrel, so you could just crank the barrel. The canvas could be pulled tighter or made looser, but it sounded like wind–albeit repetitious wind! We had thunder sheets, old stage thunder sheets.[20]

With the Disney animated films, music was never an afterthought. The various visual and sonic elements in those films were developed in a truly collaborative manner.

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[18]Schickel, op. cit., 121.

[19]Elisabeth Weiss and John Belton, eds., *Film Sound: Theory and Practice* (N.Y.: Columbia University Press, 1985), 364.

[20]Wayne Allwine, telephone interview with author, 13 Sept. 1994.

> Far from being a simple accompaniment, the music became in the Disney studio product an almost equal partner with the visual imagery, the sound effects, and the dialogue, in creating the total effect of the film.[21]

Because of the synchronization issue, the process of developing an animated film with a musical soundtrack evolved in the opposite manner to that of a live-action film. In live action film, the visuals are created first, and the music and sound effects are added in post-production. In animated film, especially films that are musicals, or have a musical pulse running through them, the music is pre-recorded, so that the animators can use it in fine-tuning the timing and style of the images.[22]

There are many contemporary exceptions to this procedure, including shows such as *The Simpsons,* in which the audio post-production is done like a live film.[23] In addition, the recent Disney animated feature film *The Lion King* was done using a combination of techniques: the songs were pre-recorded but the underscoring was done in post-production.[24]

Nonetheless, the most successful animation still seems to follow Disney's original lead, by exploiting the power that music conveys when tightly married to images. According to Walt Disney:

> There's a terrific power to music. You can run any of these pictures and they'd be dragging and boring but the minute you put

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[21]Schickel, op. cit., 120.

[22]Tim Amyes, *The Technique of Audio Post-Production in Video and Film* (London: Focal Press, 1990), 128.

[23]Greg Rule, "Inside the Simpsons," *Keyboard* 19, no. 1 (Jan. 1993): 45.

[24]Conner Freff Cochran, "Hans Zimmer and the Music of The Lion King," *Roland Users Group Magazine* 12, no. 2 (n.d.): 33.

> music behind them they have life and vitality they don't get in any other way. We have to do that with this picture. Put an emphasis on the music.[25]

Television

Although television represents a different technology, its content continues to be based primarily upon theater and film. The fixed sets found on sitcoms are very similar to those in theater. Television emulates film in the longer, on-location dramatic series, mini-series, and special effects shows like *Star Trek: Deep Space Nine.*

The significant difference between television and either film or theater, is the intimacy of the viewing experience, which is placed under the control of a small, or one-person, audience.[26] The soundtracks for television are scaled-down versions of film soundtracks, tailored to suit the smaller screen, smaller budgets and tighter deadlines.[27] Sound effects are de-emphasized, since large effects would not play well through the (usually) small speaker, and the effects which are present are often covered with

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[25]Ross B. Care, "Threads of Melody: The Evolution of a Major Film Score--Walt Disney's Bambi," *The Quarterly Journal of the Library of Congress* XL, no. 2 (Spring 1983): 83.

[26]Tony Zaza, *Audio Design: Sound Recording Techniques for Film and Video* (Englewood Cliffs, New Jersey: Prentice-Hall, 1991), 221.

[27]Fred Steiner, "Keeping Score of the Scores: Music for Star Trek," *The Quarterly Journal of the Library of Congress* XL, no. 3 (Winter 1983): 6.

music.[28] The musical scores for television shows tend to be smaller and more intimate as well.[29] Piano cues, smaller ensembles, and synthesized scores that would not play well in theaters are acceptable when coupled with the small screen. All of this affects both the process and the end result in terms of quality and content.

People accept a different type of viewing experience with television. Sitcoms, such as *Roseanne,* give us a little "window" into someone else's kitchen, bathroom, or living room, which are all intimate spaces usually reserved for close friends. Television talk shows are also intimate experiences, primarily containing close-ups of people discussing very private issues. Reciprocally, we invite the television into the private moments and places of our lives: our evenings with family or our bedrooms as we fall asleep. Television invades our most personal, sacred space.[30]

The small screen formats, such as sitcoms and talk shows, generally would not hold our interest on a large screen. Similarly, television broadcasts of feature films–especially the epic films like *Star Wars*–are disappointing experiences without the wide screen and the theater sound system. However, with the growing popularity of home theaters, people can have the option of choosing the usual intimate television experience without sacrificing all of the impact of the epic adventure. Oddly enough, the most

[28]Robert L. Mott, *Sound Effects: Radio, TV and Film* (Boston: Focal Press, 1990), 191.

[29]Russell Brower, telephone interview with author, 13 Aug. 1994.

[30]Myron W.Krueger, *Artificial Reality II* (Reading, Massachusetts: Addison-Wesley, 1991), 142.

notable upgrade to the viewing experience provided by a home theater system is that of better audio quality.[31]

Television became interactive, in a way, as soon as there was a choice of channels to watch. Now, with a hundred or more channels to choose from, and a remote control in hand, the average "channel-surfing" viewer is sculpting a unique program of entertainment with each push of a button. Television was the first visual medium to put a source of entertainment in the average home. Decades later, in addition to more traditional programming, the television was also being used to play arcade-type games. The TV screen also became the model for our window into a new type of environment, one we could customize to fit our expectations of functionality and entertainment: the home computer.

Computer Games

Over the past decade, game sound has evolved from bongs, boinks and short monophonic tunes, to polyphonic MIDI support. MIDI instruments allow more complex orchestrations, whether with the older Roland MT-32 standard, or the newer General MIDI (GM) standard.[32]

Sound effects, until recently, have been limited to what was available in the instrument presets (e.g. bird tweets, gunshots, helicopters, etc.). Beyond that, the composer needed to exercise imagination in substituting instrument timbres for sound effects. For example, a synthesizer line (in fifths with pitch-bend) is used to simulate fly-bys in LucasArts' *X-Wing*.

[31]"THX: Perfect Sound for Home Theaters," Photocopy, (n.d.)

[32]George Sanger, telephone interview with author, 4 Aug. 1994.

In another LucasArts game, *Day of the Tentacle,* the opening cartoon-like credit sequence utilizes the GM bird chirp as a "cheep" and easy effect. It is ironic that this is similar to the technique used in early Disney animation, where musical instruments–and anything else readily at hand–were used to produce sound effects as part of the score.[33]

More sophisticated game systems allow for one or more channels of digital audio, which can be used for recorded sound effects, or sampled music files.[34] Since digital audio uses large amounts of memory, it is still not feasible in most cases to have an entire game score done in this way. In addition to the memory usage, the volume of music needed for an interactive game environment is cost-prohibitive from a live performance and studio perspective. The average film needs perhaps an hour to an hour and a half of music, whereas a game can need 2-3 hours (i.e. approximately 100 cues of approximately 3 minutes in length) in order to cover all the areas of play and possible outcomes of action.[35]

Because of this astonishing quantity of music, General MIDI is still considered a practical alternative. Even as more and more products are being released on CD-ROM only, with its larger memory capacity, it is still more common to have a combination of MIDI files and digitally stored sound effects. A recent LucasArts Games release, *X-Wing,* features

[33]Frank Thomas and Ollie Johnson, *Disney Animation: The Illusion of Life* (New York: Abbeville Press, 1984), 156.

[34]Sam Powell, telephone interview with author, 27 July 1994.

[35]Michael Land and Peter McConnell, personal interview with author, 25 Mar. 1993.

digitally sampled sound effects (including Darth Vader's breathing), but the music is still in the form of MIDI files. Even so, good use was made of the memory available for sound:

> The *X-Wing* sound track is packed with digitized sound effects and memorable speech lines pulled directly from the "Star Wars" movies. Players will hear the roar of TIE fighters, Darth Vader's mechanized breathing, frenzied pilot chatter and much more. *X-Wing* also is the first LucasArts simulator to use the internally developed proprietary iMuse sound system. iMuse (Interactive Music and Sound Effects) composes music "on the fly" based on player's choices. The system allows for music in 100 percent of the game, as well as seamless transitions between dramatic sequences.[36]

A probable future application of the LucasArts iMUSE system will be in the area of sound effects, enabling them to evolve beyond spot effects and into the realm of background ambience, created in real time.[37]

History is repeating itself in the computer game industry which is now moving away from subtitles (as in early silent film) and into the realm of "talkies." For the first time, games have all the components of a film soundtrack.[38] Because of this, and vastly improved graphics, parallels between computer games and film are becoming more noticeable.[39]

> Cinema as a distinct form diverged from drama as the result of the impact of a new performance technology on form, structure and style. In complementary fashion, computer games can be seen to have evolved from the impact of dramatic ideas on the technology of interactive computing and graphical displays.

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[36]Sue Seserman, *The Adventurer,* no. 5 (Fall 1992): 15.

[37]Michael Land and Peter McConnell, loc. cit.

[38]David (Rudy) Trubitt, "Multimedia Sound," *Electronic Musician* 8, no. 5 (May 1992): 78.

[39]Brenda Laurel, ed., *The Art of Human-Computer Interface Design* (Reading, Massachusetts: Addison-Wesley, 1990), 238.

> Computer games incorporate notions about character and action, suspense and empathy, and other aspects of dramatic representation.[40]

There is, however, an important difference in soundtracks for film and computer games: film is not yet interactive. In order for the music to sound appropriate for the events happening in the game it must "follow" the user through a somewhat unpredictable maze of options. Systems like iMuse attempt to give the branching score segments and cue variations a natural flow:

> This interactivity makes game music fundamentally different from music for movies, television, and other "passive" media. Yet, with movie as an obvious comparison, it's important to create the *illusion* of inevitability in the music. In other words, the music should respond to the user's actions, while sounding as seamless as a movie score.[41]

A new style of games–usually termed "graphic adventures"–are the clearest link from computer games to film. These games are described as ones in which:

> the action is represented in a multisensory, first-person way, with a stronger central action. The designers at Lucasfilm Games have been pioneers in this shift to a more dramatic approach....[They] should be credited with inventing an approach to adventure games that delivers all the punch of a good movie.[42]

In addition, Michael Land, composer/programmer at LucasArts Games,

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[40]Laurel, *Computers as Theater,* op. cit., 53.

[41]Peter McConnell, "LucasArts Games," *Electronic Musician* 10, no. 1 (Jan. 1994): 76.

[42]Laurel, op. cit., 96.

states that although the game music tradition has been arcade style techno-pop, the composers at LucasArts have based their scoring efforts on the film and television traditions.[43]

Many of the early LucasArts games were based on familiar properties such as *Indiana Jones and the Last Crusade,* and the "Star Wars" saga. Thus far, only one of these products, *Rebel Assault,* has been released with digital music and sound effects.

> Taking full advantage of the CD-ROM medium, Rebel Assault includes sound effects by Skywalker Sound, music by John Williams (as performed by the London Symphony Orchestra), original dialogue recorded by a professional cast...[44]

Part of the reason that this was feasible with *Rebel Assault* is that the expensive score and sound effects had already been produced for the film version. The adaptation of film properties into game formats is yet another wrinkle in the computer game/film landscape. Another recent example may be found in *Jurassic Park:*

> For *Jurassic Park,* Sega has a team of writers, artists, and composers combining actual film footage with animation and sound to produce the game....Sega has built its own multimedia production studio so they're able to release the game at the same time the movie debuts.[45]

Since the production on the game version was done concurrently with the film version, this project did not use the John Williams score. Instead, new

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[43]Michael Land, questionnaire from author, 1 June 1993.

[44]Vince Lee, "Rebel Assault Hypers in for the Holidays," *The Adventurer* 7 (Winter 1994): 9.

[45]Ken Pimentel and Kevin Teixeira, *Virtual Reality: Through the New Looking Glass* (New York: Windcrest, 1993), 220.

music and sound effects files were created. In addition to the unavailability of the Williams music in the necessary time-frame, Brian Coburn (who worked on the music and sound effects for the Sega CD version of *Jurassic Park*) states that the film score would have been inappropriate for the faster-paced game environment.[46]

The challenge of translating a large-scope special effects movie into a technologically limited platform is described by Sam Powell, a composer at Blue Sky Productions, who did work for the Sega Genesis version of *Jurassic Park.*

> We deal with postage stamps. There's very beautiful postage stamps out there, you can do a postage stamp very well, you just can't use the same scope. So basically you try to make the best sound possible in the smallest amount of space....I always liken it to someone coming out [with a new car] and saying "It seats twelve, it seats twelve!" "Well, does it go around the block?" "No...but it seats twelve!" That's basically what the Mars platform is like. They say "Oh, you can play a stereo-quality sound!" Only you have the same memory amount as the Genesis, so what good is it gonna do you? In the entire game of Jurassic Park I think it was 130K, that's what I got. That's for sound and music; that's drivers too. Like I said, we do postage stamps.[47]

Because of the limitations of technology, the quality of games will be primitive for a while. Just as in film, where you have epics (with serious content, serious quality, meant to be judged critically) and light comedies (with lower budgets, meant to be used for a single evening's throw-away fun), you have the same categories of games.[48]

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[46]Brian Coburn, telephone interview with author, 27 July 1994.

[47]Sam Powell, telephone interview with author, 27 July 1994.

[48]Michael Land, telephone interview with author, 6 Mar. 1994.

Games that have humor and a level of playful enjoyment are the most successful (like LucasArts' *Monkey Island,* the Indy Adventures, and *Day of the Tentacle*). Two of the best new "games," *Myst* and *7th Guest,* move beyond the traditional "cartoon" or arcade game interface and begin to approximate a virtual reality type of environment, although they are "immersive" only in the psychological sense of the word. In some ways, "serious games" such as *7th Guest* actually call attention to the comparatively primitive technology by pushing it to its limits. An attempt to emulate film will also beg comparison to film, and then be found lacking.

The technology is not yet sophisticated enough for a visceral response to the same degree that the audience reacted to the computer graphics in *Jurassic Park.* It is, however, very well-suited to chuckles. A cartoon-like approach is appropriate at the current level of technological development in the same way that the earliest live-action films were best suited to comedy and melodrama, and the earliest animated films were cartoon shorts. Perhaps the philosophy is: "make 'em laugh with you, and not at you." Michael Land states that:

> the games industry is younger and more forgiving than film or TV, and can accept more leeway in the musical quality. For us, this translates into greater freedom for experimentation and the learning that comes from musical trial and error. This tolerance of experimentation is the payoff for dealing with the hassles of doing music for computers. But...things are getting more professional sounding as the industry matures.[49]

Land predicts that the games will be more like films when the technology allows. It seems that, at least at LucasArts Games, the trend is

[49]Michael Land, questionnaire from author, 1 June 1993.

definitely in that direction.[50] In the meantime, there are definite limitations to what the game soundtrack can achieve.

Peter McConnell, also a composer/programmer for LucasArts, points out this difference between film and game soundtracks:

> Our music is not like films. In film there is always sound. In ours it's a kind of pantomime, with the music filling in for the other elements.[51]

Land amplified McConnell's statement by saying that music's function in computer games is very similar to that for silent movies, with a piano player sitting in the theater and playing along with the action.[52] In neither case is the music truly synchronized to the picture. The cues start at a certain time and then run until they end, or another cue starts. In both cases, the music cannot closely underscore the events on the screen, but can only hope to capture a general mood or feel that will enhance the experience of the visuals.

In the film world, the arrival of talkies was the demise of the piano player. This happened not necessarily because the talkies were filled with music–they were not–but because it was impossible to coordinate playing largely improvised music, under, or around dialogue. How would the piano player know when to play and when to stop? It was a new type of accompaniment skill.

With General MIDI, although the director or designer of the game

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[50]Michael Land and Peter McConnell, personal interview, 25 Mar. 1993.

[51]Ibid.

[52]Ibid.

approves the music created by the composer, there is no control over the quality of the performance, since the user can be sending the MIDI data to anything from an inexpensive FM sound card, to a Roland Sound Canvas. The instruments may have the same names, but the actual sonic content and quality ranges so widely that there is no way for the game producers to ship something that will work consistently in all environments.

As a result, some game developers prefer to use digital audio files in their products, in spite of the memory requirements, and in spite of the inevitable compromise in sampling rate quality necessary to get the files down in size. But even these cues are not truly synchronized: they still are triggered to play and run their length, or until another cue gets triggered. This solution is analogous to shipping a record along with every print of a silent film, with detailed instructions on when in the film to "drop the needle." Nonetheless, this is still closer to a "film score" solution than General MIDI, since it at least gives the game designer and composer more control over the specific music the user will hear.

One game producer, Robyn Miller of Cyan (creators of *Myst*), avoids implementing GM support in their products out of concern for what type of device will be used to play the MIDI data. He prefers the control of using audio files, even though the music for *Myst* (a very sound intensive product) had to be stored in 8-bit format with an 11kHz sampling rate to conserve memory, and suffers in quality because of it.[53]

Michael Land, talking about the trend towards digital audio in games:

[53]Jim Aikin, "Music in the Myst," *Keyboard* 20, no. 9 (Sept 1994): 13.

> I think, aesthetically speaking, the goal is always to find the same balance that film finds....The decisions are entirely aesthetic in film. It's technical trade-offs in this industry. So that puts a different twist to it. But all of the story games, that's a no-brainer: they need to have all digital music when they're coming out on CD. That does change things a lot because we have to start thinking about doing real music production using studio musicians or really good synthesizers.[54]

Land was asked if he thought the same personnel would make the transition from MIDI-based scores to live scoring–keeping in mind that there has been a tendency to go out of house for "known talent" in other game companies. He responded with:

> Yeah that's gonna happen somewhat, but those guys are too expensive to score all the games in the world. That can happen for a novelty or you can license the [John] Williams music if it already exists. But basically it's gonna be up to the rank and file guys to do the rest of it and they're gonna be doing it the same way they do it for TV, which is as cheaply as possible.[55]

The question now is whether most arcade-style game composers will survive the transition to the craft of underscoring dialogue any better than the piano players did. As other large film companies follow LucasArts' lead into the realm of computer games, there will most likely be an influx of talent from traditional media backgrounds, such as film and television.[56] As George Sanger predicts:

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[54]Michael Land, phone interview with author, 6 Mar. 1994.

[55]Ibid.

[56]Pimentel, op. cit., 210.

> This area we're working in–music for multimedia–will very soon be just like working with music for traditional media, with the added factor of interactivity. We'll be competing head to head with everybody else who is doing music.[57]

Animatronics

A discussion of animatronics may seem like a detour in the continuum, until one remembers that the creators of the Disney theme park attractions (termed "Imagineers" since the early work on Disneyland) have had the luxury of experimenting with life-sized, 3-D, immersive, film-like experiences decades before the term "virtual reality" was coined. Since it is an out-growth of Disney's involvement in animated film, it should be placed after animation in the continuum. But in their most sophisticated computer-controlled form, the Disney animatronics attractions can be seen as paradigms for the virtual theme parks of the future. Howard Rheingold termed Disneyland "the grandfather of all large-scale artificial environments," and it is in this sense that it will be discussed here.[58]

Animatronics, strictly speaking, refers to any 3-D animated model, ranging in sophistication from the battery operated Santa in a department store window, to the whip-toting auctioneer in *Pirates of the Caribbean.* [59] There is no simple term for what Disneyland's *Haunted Mansion* is: animatronics show or attraction, theme park attraction, amusement park

[57]Paul Potyen, "Music for Video Games, Part 2," *MIX*, 18 no. 3 (Mar. 1994): 94.

[58]Rheingold, op. cit., 289.

[59]David Chell, *Moviemakers at Work* (Microsoft Press, 1987), 350.

ride–all these can refer to other types of presentations, ranging from parades to roller-coasters. To simplify the issue as much as possible, the term animatronics will be used here as a blanket term to describe the type of Disney theme park attraction that contains sophisticated animatronics figures, dialogue, sound effects and music, and therefore most closely approximates a live theater experience.

The original Audio-Animatronics, developed by Disney engineers in the early years of Disneyland, were controlled by a series of sound pulses recorded to analog tape. The same tape contained the dialogue, sound effects and music for the presentation, and in this way every cue could be synchronized flawlessly in endless performances.[60] The disadvantage of this system was that the analog tape wore out very quickly with thousands of playings per week. Maintenance became a tedium of endless tape duplication and replacement.[61]

Recently, the *Enchanted Tiki Room* became the last of the animatronics attractions at Disneyland to get a digital upgrade. Computer technology changed the original "audio" part of Audio-Animatronics: the audio is now stored on laserdisc and digital chips, and the controllers are now programmed to run with digital pulses.[62]

The *Enchanted Tiki Room* features a "cast" of birds, flowers, and carved tikis in a musical review, and was the first Audio-Animatronics

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[60]Schickel, op.cit., 332-333.

[61]Joe Herrington, telephone interview with author, 8 Feb. 1994.

[62]Roberta Brubaker, e-mail to author, 1 Nov. 1993.

attraction in the park.[63] By the time *Great Moments with Mr. Lincoln* opened two years later, it seemed clear to some of the designers that a new form of theater was developing. Sculptor Blaine Gibson, creator of many animatronics models, stated that it seemed to him they were "getting into areas that were competitive with acting."[64] The actors may be mechanical, but in a way animatronics is an electronic version of theater. Although the audience is surrounded by computer driven creatures and man-made environments, the spectacle, the music, the *effect* is the same as other dramatic forms.

In fact, film had a great influence over the evolution of Disneyland:

> To Walt Disney, the creation of a theme park was the next logical step for a man who had spent most of his life making movies. In many ways, his "magical little park," as he called it, would be just like the movies. It would have stories, themes, sets, actions, dialogue, humor, drama, happy endings and, of course, music. But there would be one very important difference. At Disneyland people would feel as if they were actually walking into the movies. Instead of just sitting in a darkened theater vicariously enjoying a motion picture up on a screen, they would be right in the middle of it with the action unfolding all around them.[65]

Films were Disney's medium, and ultimately the artists, designers and musicians that created Disneyland were people moved over to that project from the studio.[66] The preparation for the attractions and the physical

[63]Randy Bright, *Disneyland: Inside Story* (New York: Harry N. Abrams, 1987), 168.

[64]Bright, Ibid, 172.

[65]David J. Fisher, *The Music of Disney: A Legacy in Song* (The Walt Disney Company, 1992), 51.

[66]Bright, op. cit., 63.

structures of the park resembled storyboarding a film more than planning a traditional park; all the elements were combined and sequenced carefully for effect.[67] Details, often too minute for guests to notice consciously, were lavished on the park.[68]

Many of the early attractions (*Peter Pan's Flight, Snow White's Adventures, Mad Tea Party,* etc.) were 3-D realizations of Disney animated films.

> In many ways, Disneyland is similar to a Disney animated film. Each of its main attractions plays the same role as the animator's "key frames" for the film, the frames that convey the extremes of the action. The "Snow White Wishing Well" functioned as one of the many "in-betweens" that linked the key frames together to complete the 3-D animated "film" called Disneyland.[69]

In an earlier section, reference was made to the multi-sensory potential of theater. Similarly, the illusion in animatronics is effective because all the senses are engaged: the sounds are authentic, the music is catchy, the smells are realistic–damp caves, or dusty attics–and the visuals entertaining. This is illustrated by the following description of Disneyland's *Submarine Voyage:*

> Throughout there is a realistic-sounding dialogue between captain and crew on the intercom; the oily smell of machinery at close quarters pervades the air, and there is a deliciously claustrophobic quality to the experience–not enough to frighten you, but just enough to jerk you out of the attempt to remain a detached, nonparticipant observer of the fantasy.[70]

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[67]Ibid., 49.

[68]Ibid., 61.

[69]Ibid., 156.

[70]Schickel, op. cit., 325.

Animatronics is not like film in that it cannot tell a linear story with much success. Marc Davis quotes Walt Disney as saying, "You can't tell a story from beginning to end with a climax, as in a film, if you're moving."[71] Therefore each animatronic segment has been described as a story-telling tableau, where the spectator can gain an impression of the action and meaning of each scene in the very short time before being moved on to the next one.

> It's not a story-telling medium (in the sense of a movie). But it does give you experiences. You experience the idea of pirates. You don't see a story that starts at the beginning and then ends up with 'By golly, they got the dirty dog.' It wasn't that way. It was scene after scene, and that really works out very well in that attraction. People see it over and over again and they always discover something new every time.[72]

One of the lessons that the Imagineers carried with them from animated film is a skill with caricatures. In animation, characters need to be created with exaggerated traits or expressions that can be quickly assimilated by the audience. This is equally important in a ride environment since each "scene" passes by rapidly, and any given spectator's attention may not be fully focused on that specific area during the time the ride allows for viewing it. This factor, crowds being moved through the scenes quickly (as opposed to scenes being moved past the crowd in film), affects the functionality of all the components of the attractions, from the song lyrics, to the telegraphing of upcoming mood

[71]Libby Slate, "Marc Davis: Animator, Imagineer, Friend," *Disney News* 27, no. 4 (Fall 1992): 26.

[72]Fisher, op. cit., 24.

changes found in the musical scores, to the clearly stated sound effects. Each of the parts is in balance with the others, exaggerated partners in the illusion.

Certain attractions, like *Pinocchio,* although entertaining on first visit, seem to make more sense both with repeated visits and, most importantly, after having viewed the film. Surely Walt Disney expected visitors to his park to have seen his films, and hence have at least a basic idea of the story portrayed. As the designs moved into original (nonfilm-based) concepts such as *Pirates of the Caribbean* and *Haunted Mansion,* the story continuity needed help. There are still many story tableaux–stage "sets" as it were–in both attractions, but there is more emphasis on soundtrack continuity. In effect, the song "Yo Ho Yo Ho A Pirate's Life For Me" does tell the story of the attraction, saying in effect, "this is what a pirate's life is, this is what you will see them doing." The music continues throughout–or at least appears to continue since it is picked up again from time to time–giving the experience cohesion and a sense of a storyline.

A more film-like presentation was enabled by the introduction of "atmobiles," the individual cars that twist and turn as they are conveyed on the omnimover system through the attraction:

> For the first time, the designers could "edit" the scenes on a ride, using the eyes of the guests as a motion-picture camera. By turning the vehicles...the designers could "aim" the guests directly at a specific scene, then "cut" the scene by spinning the car in the opposite direction. It was the ultimate marriage between motion-picture storytelling and three-dimensional entertainment.[73]

[73]Bright, op. cit., 200.

In *Haunted Mansion,* spectators riding in the "doom buggies" have their attention directed to fairly precise visual moments. The presentation in *Haunted Mansion* is experiential rather than chronological. There is no linear sequence of events, but rather a exploration (albeit conducted) of the "house" environment. In this respect, it is similar to virtual reality systems as they are currently being presented. In both instances the environment is given emphasis over the story.

> If you forget about modern technology for a moment and think back to bread and circuses...the mass-marketing of manufactured experiences in virtual spaces is an old tradition....The present multibillion-dollar worldwide experience business is jumping into new electronic media to such a degree that its low-tech origins are obscured, but it originated and evolved from circuses, carnivals, roller coasters, and funhouses into miniature fantasy kingdoms set inside vast parking lots.[74]

Disney made a successful transition into a new form of entertainment with his "park" by fully utilizing skills (such as design, story-telling, synchronization of sound and music) honed in animated film.

> Walt was a communicator, of course, and a motion picture man. He knew the limits of motion pictures and he knew that something was missing in communicating with images alone. As you sit in a darkened place, and you look out of a kind of a window which the screen provides, you have a kind of vicarious experience there. It's not the same as if you actually walked down the street yourself. I think that's really why Walt wanted to simply step from motion pictures into another kind of reality.[75]

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[74]Rheingold, op. cit., 288.

[75]Jack E. Janzen and Leon J. Janzen, "Another Kind of Reality: An Interview with John Hench," *The "E" Ticket*, issue 17 (Winter 1993-94): 17.

In the same way, the tools gained in other media, such as film and computer games, could be used to mold virtual reality into a cohesive whole.

Virtual Reality

> Just as radio incorporated vaudeville before finding its own entertainment forms, and TV incorporated radio variety shows before finding its own way, virtual reality entertainment will use video games and movies as a stepping stone to something new and original.[76]

Although various terms have been coined for this emerging technology (including artificial reality and cyberspace), the term "virtual reality," or simply "VR," seems to have gained the most popular acceptance.[77] This is, therefore, the term we will use in this discussion.

The definition of virtual reality seems to be as mercurial as the evolving technology which implements it. It can most cogently be defined as "a graphic fantasy world in which a person uses his or her whole body to participate in an experience created by the computer."[78]

Not all products being called "virtual reality" are interactive. Many of them allow the participant to move around, to look at the environment from different perspectives, but not to make any changes. This type of experience

[76]Pimentel, op. cit., 224.

[77]Sandra Kay Helsel, ed., *Beyond the Vision: The Technology, Research, and Business of Virtual Reality* (Westport, Connecticut: Meckler, 1992), 112.

[78]Myron W. Krueger, *Artificial Reality II* (Reading, Massachusetts: Addison-Wesley, 1991), 64.

has been called "surrogate travel."[79] A new example of surrogate travel is the *Aladdin's Magic Carpet* attraction being showcased at Epcot Center's Imagineering Labs exhibit. Participants can fly a magic carpet through the surroundings but have no real interaction with the environment.[80]

Virtual reality is generally called "immersive" as a means to differentiate it from a more two-dimensional interaction with a computer, such as a CD-ROM game. However, the differentiation may not be as clear-cut as that. Immersion is a subjective experience. We can be immersed in anything from a television show to a good book–anything that engages our attention to the exclusion of outside distractions.[81] Given this definition, there are many players of CD-ROM games that would probably quibble as to how "immersive" their experience is. Those environments are engaging in a way that many virtual reality products have not yet achieved. As one game player described his experience of the CD-ROM game *Myst:*

> It was addictive...The only problem was when I began clicking on things in real life. I'd see a manhole cover...and my forefinger would start to twitch. [82]

Another attempt to delineate the difference between multimedia (including CD-ROM) products and virtual reality states that the latter features created environments, and the former combines older media, such as text, graphics, sound, into a new product.[83] Again, *Myst,* and even the

[79]Rheingold, op. cit., 146.

[80]Russell Brower, telephone interview with author, 13 Aug. 1994.

[81]Pimentel, op. cit., 15.

[82]Jon Carroll, "Guerillas in the Myst," *Wired* 2, no. 8 (Aug 1994): 70.

[83]Pimentel, op. cit., 10.

game *7th Guest,* fall through the cracks of this definition, since they both create rather complex and engaging environments for us to explore and with which we can interact.

In some ways it might be easiest to consider that these, and the similar products that will doubtless follow, are a type of "proto-VR" in search of an appropriate consumer platform. As such, the designers of VR environments can learn much by investigating the achievements of this other medium.

Some of the enabling technologies that make the emergence of VR possible include animated film and computer game interfaces. The convergence of these different media adds unpredictability as paths unexpectedly converge to form this new entity.[84]

Film can teach virtual reality how to merge elements of picture, sound and dialogue into a compelling experience. Lucas has already proven that the film and VR marriage is effective, with the *Star Tours* attraction at Disneyland, which combines a motion simulator platform and a synchronized film.[85] But this kind of experience is not yet interactive. Virtual reality can learn the lesson of interactivity from computer interfaces.[86]

Early VR projects, especially those developed by Myron Krueger, are similar to the first interactions between live action humans and animated

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[84]Rheingold, op. cit., 61.

[85]Steve Glenn, in Helsel, op. cit., 65.

[86]Laurel, op. cit., 456.

characters in early film shorts (such as Walt Disney's "Alice" series).[87] Krueger discusses the connection between animation and VR:

> The Disney films "Song of the South" and "Who Framed Roger Rabbit" demonstrated that animated characters could be made to interact with human actors in any way imaginable. Now we must show that what is mere illusion to the passive observer can be compelling experience to the participant.[88]

As physical representations of ourselves (whether our bodies, or just a gloved hand) get placed in a 3-D environment, we are actually participating in an animated film–as one of the animated characters–in a manner that's a little like a trip into *Who Framed Roger Rabbit*'s "Toontown."

Krueger states that his work is roughly equivalent to films before the "talkies," since speech recognition is not yet feasible in VR.[89] The contrast is, of course, that there can be other audio components bundled in the experience, including sound effects, music, and recorded dialogue segments. Currently however, these elements are not yet fully interactive, although several ideas for making them so are under development. These include the possibility of real-time Foley (footsteps, etc.) and sound effects generation.[90]

Although virtual reality in all likelihood will not become a venue for constant dialogue (since the current trend is toward first-person

[87]Frank Thomas and Ollie Johnson, *Disney Animation: The Illusion of Life* (New York: Abbeville Press, 1984), 29.

[88]Krueger, op. cit., 98.

[89]Krueger, op. cit., 224.

[90]Rory Stuart, in Helsel, op. cit., 226.

exploration of environments), the way to use music without conflicting with continuity and other sounds is already problematic. Images and localized sound effects seem a safer approach in most applications, although, as in the early years of sound film, often music is used wall-to-wall as a background to the experience.

Synchronization is a complicated issue in VR, as it was in game sound. Sound cannot be locked to picture as it is in film, since the visuals can and do run at variable frame-rates. If the audio is run at these same varying speeds it will no longer be recognizable.[91] Therefore, musical cues in VR are still triggered by certain events in the virtual environment, for example: the music begins when you enter a room, and gets turned off when you leave and the door slams behind you. If you should chose to move through the room quickly, however, you would not hear more than a snippet of the music, thereby spoiling the intended effect. This poses a challenge to designers and composers.

It would seem that even this early in the development of the medium, two types of VR have emerged in the entertainment market: the first tries to provide the participant with a particular type of experience and emotion (such as *Virtual Glider*) and the second provides an environment, as realistically as possible, for the participant to create his or her own experience (*Red Planet*).

The graphic resolution of VR is generally much lower than high-end computer games at this stage. This is due to the increased complexity and greater memory required by images being generated from any of several

[91]Pimentel, op. cit., 121.

different perspectives, in real-time. Many of the forerunners involved in this work, such as Evans and Sutherland, have only just recently expanded into adding soundtracks to their products.[92] Current audio technology produces results that are far more realistic than that of the visuals, and because of this, sound can be very useful in enhancing the VR experience.[93]

In virtual reality, sound needs to be localized in the 3-D space, sometimes attached to objects that move around in the field of vision, or into the "offscreen space," and sometimes changing audio perspective to match the visual perspective.[94] Most commonly this is done with Crystal River Engineering's Convolvotron hardware, which takes a monaural sound source and processes it in a way that simulates binaural hearing.[95] The effect of this can be quite convincing. A description of the potential of the Convolvotron follows:

> This device could place the sound of your footsteps away from your feet....It can make a mosquito buzz in your ear. If there was a fan in the environment, its sound would stand still as you turned your head, heightening your sense that it was really there.[96]

Of the several VR implementations experienced by the author, only one, Evans and Sutherland's *Virtual Glider,* attempted to use music in an interactive way. Most environments limit audio implementation to spot

[92]Jeff Edwards, Telephone interview with author, 28 Sept. 1994.

[93]Laurel, *The Art of Human-Computer Interface Design,* op. cit., 431.

[94]Pimentel, op. cit., 50.

[95]Ibid., 122.

[96]Krueger, op. cit., 142.

sound effects, intended to enhance the realism of the environment, or convey information about the environment such as relative position of objects. Eric Huffman, of Virtual Worlds, talks about the use of sound in their VR environment *Red Planet:*

> All the continuous sounds we have in the game right now–and the event-oriented stuff–are designed to have a psychoacoustic kind of translation of the world parameters into something that you can actually hear. [97]

VR's similarity to film is not strong at this point in its development. Creating the physical environment is such a challenge that any subtlety is not practicable. The current emphasis in VR is generally on environment, not storyline. Huffman states:

> The thing that I've found with something like video, or film, or linear theater, is that you have something that follows a linear path through time and you can really sculpt moments to have the emotive effect you want them to have. What we're doing is we're actually just presenting an arena in which people can interact with each other. In a lot of ways it's very different. *7th Guest* or *Myst* I think of as being interactive novels–but we're not creating a novel for people to explore as much as a format for them to interact.[98]

Red Planet is an environment in the true sense of the word: plotless surroundings, in which the players can interact within certain limited parameters. The only plot that develops is one which the players create by interacting with each other.[99] The human element is paramount in this

[97]Eric Huffman, telephone interview with author, 13 Sept. 1994.

[98]Ibid.

[99]Ibid.

type of experience. In the case of *Red Planet,* the physical locality (called a "store") is a coffee house, designed to foster camaraderie, create a themed mood, and to eventually culminate with the VR adventure itself.

> It really is sort of like a digital theme park. It's totally wrapped up in a package that gives it a certain type of feel. When you actually start doing it, you're very initiated into the whole experience.[100]

The strength of the current technology is the physical interaction with the environment: you can choose to move around, you can stand still, you can interact with objects and other participants. Although the potential is there to make the experience very filmic in the future, at this juncture, with limitations in graphics, memory storage, and sound synchronization, the best that can be hoped for is to give the participant a taste of a new world.[101]

> Thus the spacemaker can never hope to communicate a particular reality, but only to set up opportunities for certain kinds of realities to emerge. The filmmaker says, "Look, I'll show you." The spacemaker says, "Here, I'll help you discover."[102]

Scientific and military technology filtered into the consumer market with the flight simulator motion-platform used in *Star Tours* at Disneyland, and, decades earlier, with the technology that enabled the development of Audio-Animatronics.[103] Similarly, the technology for manipulating robots in outer space, or docking complex molecules is beginning to be applied toward more fantastic uses by the entertainment

[100]Ibid.

[101]Krueger, op. cit., 265.

[102]Randall Walser, in Rheingold, op. cit., 286.

[103]Schickel, op. cit., 333.

industry.[104] As this happens to a greater extent, VR may evolve from a technology to an art.

> The D.W. Griffiths, Orson Wellses, and Alfred Hitchcocks of VR haven't appeared yet. However, the people with the most experience in creating simulated experiences haven't been sitting idly by....The major dream factories of Hollywood have their own VR projects underway. With the time and money to develop their ideas before revealing them to the public, they're heading from the video-game paradigm in directions closer to the "computer as theater" vision of Brenda Laurel.[105]

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[104]Katherine Stalter, "Multimedia: Traditional Producers Are Exploring the Worlds of Interactive and Other New Media," *Film and Video* 10, issue 9 (Sept. 1993): 82.

[105]Pimentel, op. cit., 221.

CHAPTER 5

Media Examples

In previous chapters, considerations in functionality and interactivity of soundtrack elements have been applied across media boundaries. In this chapter, examples from the categories of film, computer games, animatronics and virtual reality will be considered in greater detail.

Film soundtracks have been evolving for decades, both in artistic style and technology and offers more latitude for creativity than the newer media. However, the latitude afforded by the technology and the scope of most projects is often offset by short production deadlines and a lack of understanding of audio's potential. As a result, many films have mediocre soundtracks. The exceptions, however, can be extraordinary achievements: films that garner awards and challenge the status quo, raising the standards for the entire industry. The two films analysed here, *The Haunting* and *Jurassic Park,* are noteworthy both for the care that was taken in creating the soundtrack, and for unusual choices in soundtrack design.

Unlike film, the technological limitations with computer media are formidable. Chris Brandkamp, of Cyan, states that mid-way through development of their CD-ROM game *Myst* new tools became available that allowed them to do things in a different way than they could have possibly foreseen.[1] If one cannot predict the impact of technology within the

[1]Chris Brandkamp, telephone interview, 16 Aug. 1994.

lifespan of a single project, how can one do so for the future of the medium? These product designers are still "inventing the wheel." Because of this, the question becomes not so much "Where are we going?" but rather "How do we get it to roll?" Nonetheless it is still possible to see, in current breakthrough products like *Myst* or *7th Guest,* examples of both careful soundtrack design (in *Myst*) and preventable shortcomings (in *7th Guest,* used here as an example).

In the case of animatronics, the critical difference is the use of actual physical space. While waiting in line for an attraction, the stage is set for the experience, such as the bayou in twilight in Disneyland's *Pirates of the Caribbean* or the walk up to the *Haunted Mansion.* The damp cave smell and the dusty attic add that extra element of sensory involvement that only a good dose of pseudo-reality can give. Because of this, these attractions do not need music to enhance emotional impact to the degree that two-dimensional media do: the impact conveyed by the physical environment and actual experiences is significant. Instead the music, or more specifically the songs, often serve to *mitigate* the impact–a functionality that will be examined later in a discussion of the *Haunted Mansion.*

Virtual reality is such a new medium that there are as yet no standard hardware configurations or production methodologies. To a degree greater than that of computer games, the creators of this technology are facing obstacles in actualizing every component of their products, including audio. For the most part, products appearing at VR conventions demonstrate new user interfaces, improved graphic resolution, or reduced lag time. Often

the exhibitors, although ostensibly "selling" these products, neglect the power of sound to enhance visuals or provide the illusion of more interactivity.

Evans and Sutherland's *Virtual Glider* is a rare attempt to use image and audio jointly to create an illusion of mood and movement. It will be discussed here in terms of limitations and issues of interactivity and soundtrack design.

The Haunting

> But it was 1963 before the finest goose-pimpler appeared: Robert Wise's *The Haunting,* in which nothing happens but everything does. A chilling exercise in light, shadow, and music with no blood, skeletons, or plastics guts, it is probably the most terrifying film of the century. Terror, thy name is subtlety.[2]

Reportedly, this film was screened by the Walt Disney Imagineers while designing the *Haunted Mansion* attraction at Disneyland.[3] The film doubtless inspired effects such as stretching doors and unseen pounding noises which appear in the hallway of the attraction. *The Haunting* is also cited as being a source of inspiration to the designers of *7th Guest.* [4]

The producer of *The Haunting,* Robert Wise, was the editor on

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[2]Ray Bradbury, "The Birth of the Boos," *TV Guide* 41, no. 43 (Oct 23, 1993): 32.

[3]Howard Wornom, "The Haunted Mansion, Part II," *Storyboard* 2, no. 6 (Nov/Dec 1989): 15.

[4]Rusel DeMaria, *7th Guest: The Official Strategy Guide* (Rocklin, California: Prima Publishing, 1993), 325.

Citizen Kane, two decades earlier.[5] There is more than a passing resemblance between the dramatic black and white exterior shots of Hill House, and those of Xanadu in the earlier film.

It is apparent that great care was taken in this film with the overall soundtrack design, separating scenes with dialogue, silence, sound effects, and underscoring in contrasting combinations.

Sound Effects

For the most part, the sound effects used in the soundtrack stay faithful to the novel upon which the film is based: Shirley Jackson's *The Haunting of Hill House.* Jackson's descriptive phrases (some of which are in the analysis section) demonstrate that writers often include critical aural imagery, typical of good "stage setting," which may provide useful clues to a sound designer (or, in this case, the composer).

In many sections of the novel, Jackson is describing a radio play in which the sounds are paramount and the images are static. The reader's mind conjures up the sounds and sights described by Jackson. In the film, the sound effects creators had to convey subtle events such as "fondling the doorframe."[6]

The most important interpretive point communicated by the novel is

[5]Steven C. Smith, *A Heart at Fire's Center: The Life and Music of Bernard Hermann* (Berkeley, California: University of California Press, 1991), 83.

[6]Shirley Jackson, *The Haunting of Hill House* (New York: Popular Library, 1959), 142.

that the sounds are, in fact, the "haunting," and the ambiguity of their source (the house or Eleanor's head) is the basis for the psychological nature of this thriller.[7] This ambivalence needs to be reflected in the soundtrack, and, in this respect, the film was extremely successful.

> As for sound effects, their separation from their source can produce suspense that ranges from the familiar off-screen footsteps...to the mysterious noises and screeches throughout *The Haunting* (1963), whose effects...remain unexplained and unidentified.[8]

The "real world" sounds in the film also required special treatment. The stylistic approach taken by Wise was one of extreme selectivity. In many scenes the sound design premise seems to be one of eliminating all sounds except those that are selectively important to Eleanor: her sonic impressions of her home, her journey, and Hill House.

Vocal timbres are heard during periods of "haunting" including laughter, crying, breaths and unintelligible muttering. Generally these appear in sound effects montages, giving movement and meaning to static images of doors and walls.

Music

The audio fidelity of the film soundtrack is fairly poor, so a clear impression of the orchestration is problematic. An attempt was made by

[7]Ibid.

[8]Elisabeth Weis and John Belton, eds., *Film Sound: Theory and Practice* (N.Y.: Columbia University Press, 1985), 65.

this author to obtain a copy of the original conductor's score. Inquiries led to MGM/Turner librarian Scott Perry, who reported that the score for *The Haunting* was recorded in Europe, and probably for this reason MGM never received a copy for their archives.[9] Descriptions of the orchestration are therefore general in this discussion.

Composer Humphrey Searle developed themes for several elements in the film. The main melodic theme appears in the opening credits. A significant use of the theme is under Eleanor's "dance" with Hugh Crane in the atrium. Another theme, a short motive with flutter-tongue muted brass, underscores exterior shots of the house throughout the film.

The most significant motive is "Eleanor's theme," which accompanies that character's internal monologues. The texture of the theme is light, usually orchestrated with high celesta arpeggios over a dissonant string pad, but the tonality of the theme is dark, in keeping with these glimpses into her disturbed inner world. Jackson refers to Eleanor's theme as "a tag end of a tune" which dances "through her head, bringing distantly a word or so."[10] In the novel, the lyrics of the tune, "Journeys end in lovers meeting," finally come to Eleanor as she arrives on the steps of Hill House."[11] In the film, she speaks those words to herself much later in the story, after an intimate conversation with Dr. Markway. The audience has no clear indication that the words are connected to the music accompanying her thoughts. The implication in the novel is that this tune

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[9]Scott Perry, telephone interview with author, 14 Sept. 1994.

[10]Jackson, op. cit., 18

[11]Jackson, op. cit., 27.

continues to "haunt" Eleanor throughout the story.[12] The underscoring reflects this by its consistent use of the motive in the film.

Eleanor is portrayed as getting progressively more detached from reality, more completely immersed in her circular thoughts, her "tune." The soundtrack reflects her inner and outer realities by eliminating all sound effects when this cue comes in, allowing the moments to play with just her narration and music.

A cue for a child's record played in Eleanor's living room is the only instance of source music in the film. This theme, contrastingly happy, does not recur melodically in the film, but has similar instrumentation to Eleanor's theme (which occurs as the next musical cue) and was possibly intended to connect the audience with this scene–perhaps to remind them of the circumstances of her real life and her desperate need to escape it.

Interaction Analysis

Overall, this soundtrack is a clear example of autonomy. The music speaks for the deep psychological effect of the house (primarily upon Eleanor) and produces a similar affective state in the audience. The sound effects are either naturalistic Foley or a designed part of the story line. Segments of dialogue and quiet Foley buffer and contrast with louder sections of underscoring and critical sound effects. Figure 5 shows the placement of soundtrack elements in the opening scenes of the film.

[12]Jackson, op. cit., 65

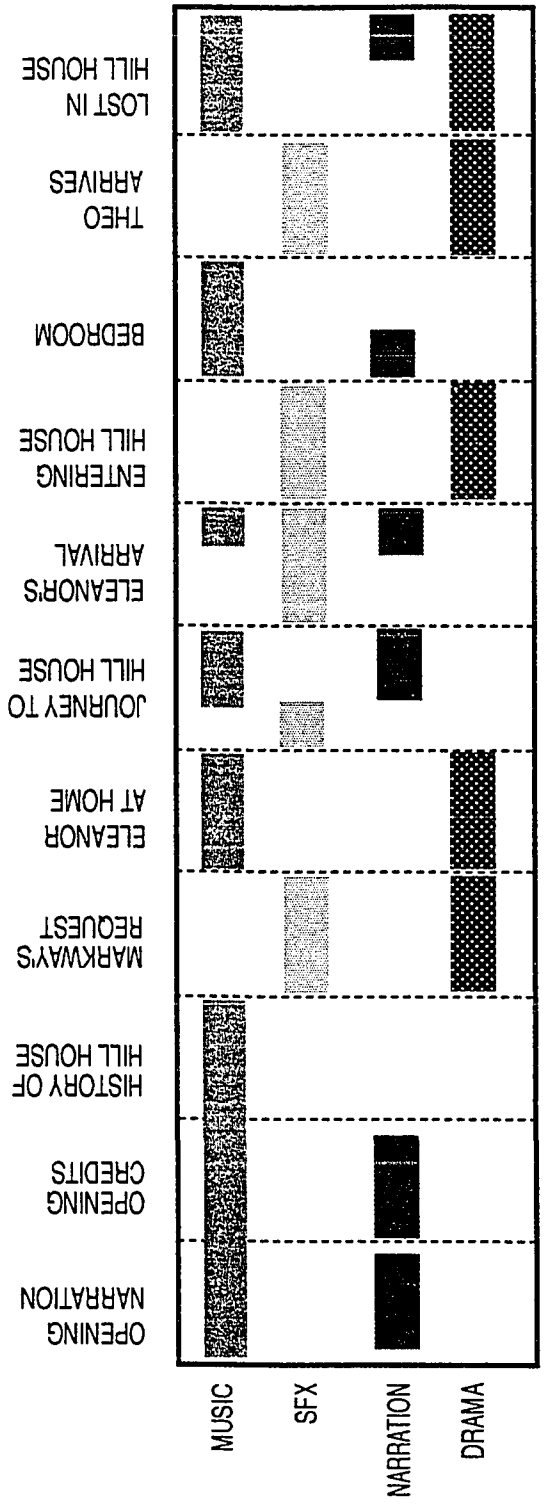

Figure 5

The Haunting Soundtrack Diagram

Opening Scenes

The History of Hill House

The film begins with narration and underscoring only. This section transitions into the opening credits with a full musical statement of the theme. In the first scene of the film the narration resumes a recounting of the history of Hill House, with underscoring only (no sound effects). During this segment, the score Mickey-Mouses events such as horses rearing in terror and a cane rapping against the wall. This sequence ends with the first dialogue scene: Dr. Markway getting permission to use Hill House for his research. During this scene, the soundtrack provides effective contrast to the previous sequence by using only dialogue and Foley effects.

Eleanor's Living Room

This scene provides an example of source music's effectiveness when used in emotional counterpoint to the action on the screen (i.e. seemingly indifferent to the feelings of the character). At the beginning of a heated argument between Eleanor and her sister, the little niece is seen briefly playing a small phonograph. This children's record is created in the score using A and B sections (a light music box feel, contrasting with a more circus-like section using a piccolo melody). The level of the music on the soundtrack is loud and intrusive. The characters raise their voices, both in

anger and in order to be heard over the "record." Even so, the audience must concentrate to follow the dialogue because of so much competition from the music. The result is that this is a very effective way to communicate tension and frustration: by the end of the scene the audience probably feels the need to escape from this claustrophobic room almost as urgently as does Eleanor.

At the conclusion of the argument, a snare drum roll catches the peak of Eleanor's angry reaction. She jumps up and turns off the record.

Journey to Hill House

Eleanor's first internal monologue occurs as she is pulling the car out of the garage. The underscoring ("Eleanor's theme") plays with no sound effects. During her drive to Hill House this monologue/underscoring combination alternates with outside occurrences (reaching crossroads, consulting a map, etc.) which are underscored with the main theme in a major key version. The moments of outside reality have sound effects, whereas the internal monologues do not.

Arriving at the Gate

Eleanor's arrival at Hill House has a sparing use of sound effects: the engine stops, the horn honks, then dialogue is isolated on the track until the caretaker removes the chain from the gate. On the approach to the

house there is no car engine sound, just underscoring (a forceful "angry" version of the main theme). The car stops suddenly (and audibly) when Eleanor rounds a bend in the driveway and sees Hill House. Then the inner monologue underscoring (Eleanor's theme) resumes.

Entering Hill House

There is a sparing use of Foley in this scene, which reflects Jackson's intention when she wrote that "the sound of her feet on the wood of the veranda was an outrage in the utter silence....the door opened wide without warning."[13] Eleanor's footsteps are very clear, but the front door, when it swings open and closed, does so without a sound.

Lost in Hill House

After the arrival of Theo, she and Eleanor get lost in the house while exploring their surroundings. This scene is played with underscoring and dialogue. One vocalized sound effect occurs when Eleanor hears a breathy sigh pass by her and says, "She didn't hear that." The underscoring builds in intensity up to the moment that shadow starts to envelope Eleanor and she calls out "Don't let me go! Theo stay with me!" There is a sudden cut to silence when Dr. Markway opens the door to the hallway.

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[13]Jackson, op. cit., 27

First Night in Hill House (the pounding)

This scene begins with a shot of the staircase at night, which is played in silence for a moment before distant, echoing pounding can be heard (with sound effects only). The scene cuts to Eleanor's bedroom and the pounding gets louder. There is a short "Eleanor" cue under her thoughts while she wakes from a dream in which her mother is pounding on the wall for help. As she realizes where she is, the pounding is suddenly loud again and reverberates over a shot of the closed bedroom door. In the following moments strange noises, scraping, direct knockings on the door (without reverberation), and vocalizations contrast with quieter sound effects and sudden silence.

Jackson describes the sound in this scene as follows:

> It sounded...like a hollow noise, as though something were hitting the doors with an iron kettle, or an iron bar, or an iron glove. It pounded regularly for a minute, and then suddenly more softly, and then again in a quick flurry, seeming to be going methodically from door to door at the end of the hall....the hammering was against the upper edge of the door, higher than either of them could reach...Little pattings came from around the doorframe, small seeking sounds, feeling the edges of the door, trying to sneak a way in. The doorknob was fondled....The little sticky sounds moved on around the door frame and then, as though a fury caught whatever was outside, the scratching came again....and again there was a silence....A thin little giggle came, in a breath of air through the room, a little mad rising laugh, the smallest whisper of a laugh...a little gloating laugh moving past them around the house, and then she heard the doctor and Luke calling from the stairs and...it was over.[14]

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[14]Jackson, op. cit., 92-94.

During this scene Eleanor thinks, "Whatever it is, it's just a noise," which is almost literally true in this film. The only visual evidence of these events is a slight movement of the doorknob; the rest of the narrative is conveyed by camera angle and sound effects.

Second Night in Hill House ("Whose hand was I holding?")

The second extensive sound montage sequence occurs during this scene. Once again, Jackson's passage in the novel is accurately depicted in the soundtrack. She describes:

> the steady low sound of a voice babbling, too low for words to be understood, too steady for disbelief...the low steady sound went on and on, the voice lifting sometimes for an emphasis on a mumbled word, falling sometimes to a breath, going on and on. Then without warning there was a little laugh, the small gurgling laugh that broke through the babbling, and rose as it laughed, on up and up the scale, and then broke off suddenly in a little painful gasp, and the voice went on....Then the little gurgling laugh came again, and the rising mad sound of it drowned out the voice, and then suddenly absolute silence...then she heard a little soft cry which broke her heart, a little infinitely sad cry, a little sweet moan of wild sadness...and then...came the wild shrieking voice...she knew she had always heard in her nightmares.[15]

The only music occurs during Eleanor's short inner monologue. At the end of the sequence, the moment when she finally yells is followed by underscoring.

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[15]Jackson, op. cit., 114-115.

Jurassic Park

Superficially, the soundtrack for *Jurassic Park* would seem to be standard special effects film fare: an epic score and huge sound effects. However, in this case the soundtrack was created under at least two circumstances which are fairly unusual in the industry. The first is that sound effects, in several scenes, were allowed to play without music, and were planned to do so by the filmmaker, Steven Spielberg. This is the case with the main road attack by the T. Rex (the name used for the Tyrannosaurus in the film).[16] John Williams' music for the film also benefited from a higher than usual amount of collaboration, since he composed the score at Skywalker Ranch only yards away from where the sound effects were being created. Sound supervisor Richard Hymns describes the advantage of this arrangement:

> In the past, the sound supervisor and the music composer went about their chores separately. The musician would be off writing somewhere and we would be working on our sound effects. Then we'd arrive at the mix together; and invariably there would be spots in the film where the sound effects and the score didn't mesh well. So we met with John earlier on, premising our sound effects for the major scenes so that he would know what we were doing. That way we could avoid discordant things and we could also make 'holes' for each other so we wouldn't interfere with each other as much. It was a fairly new kind of collaboration, at least for me.[17]

The resulting soundtrack has moments where sound effects are

[16]Rydstrom, telephone interview, 3 Aug. 1993.

[17]Don Shay and Jody Duncan, *The Making of Jurassic Park* (New York: Ballantine Books, 1993), 145.

dramatically showcased (the raptor feeding sequence, the dinosaur stampede, the spitter scene) as well as moments in which music is allowed to come to the foreground, such as the "Welcome to Jurassic Park" and "Remembering Petticoat Lane" sequences.

Sound Effects

Work on the sound effects for this film began more than a year before the release date in the summer of 1993. This time-frame allowed the luxury of extensive location recording of exotic ambiences and animal noises. This process created a large library of original material that could be used to give the film a unique sound pallette.[18]

The dinosaur vocalizations were perhaps the greatest creative challenge presented in the film. As Gary Rydstrom explains:

> In past dinosaur movies you would hear the same roar over and over again. What we wanted to do for Jurassic was develop a fuller, more natural vocabulary for these creatures–breathing and grunting and sniffing, even the sound of the eyelids moving or the nostrils flaring. We were striving to make it completely believable.[19]

Since the animals being depicted had never actually been heard by man, any implied "realism" was debatable. Although Rydstrom researched scientific theories about vocalizations, he did not use this as the basis for his creative work. Rydstrom states:

[18]Ibid., 141.

[19]Ibid.

> I found out that there are many things scientists just don't know....The input I got from Spielberg was just to make all the dinosaur sounds believably animalistic–something people could relate to....We couldn't get too far out with the dinosaur sounds–even if there was scientific evidence to support that–because the audience had to be able to connect with the animals.[20]

This approach is justified in light of the discussion in Chapter Two about sound being most effective when it is familiar.

The T. Rex vocalizations in the film were a composite of various animals, including elephant, alligator, penguin, tiger and dog. The huge trumpeting roar is based on a baby elephant scream, with some tiger and alligator mixed in to add mid and low frequencies. The breathing was derived from a recording of whale blow holes.[21]

The sound effects needed to reflect the intelligence ascribed to the raptors. A variety of vocalizations convey the ability of the creatures to communicate with each other.[22] Rydstrom's concern was that these different sounds would be perceived as produced by the same animal.[23]

Even more creative license was taken with the larger dinosaurs:

> Large animals, like giraffes, generally don't vocalize all that much. But the brachiosaurs in the movie convey a real sense of wonder and beauty, so we gave them a beautiful, melodic singing voice.[24]

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[20]Ibid.

[21]Ibid., 144-145.

[22]Ibid.

[23]Michael Marans, "Sound Effects: From Footsteps To Space Ships," *Keyboard* 16, no. 3 (Mar. 1990): 41.

[24]Shay, op. cit., 145.

An interesting example of collaboration, not unlike that found in animated film, occurred when early work on the sounds had been completed. These sounds were taken to the set to allow the dinosaur puppeteers a chance to synchronize mouth and body movements. This process led to some creative discoveries:

> They had to know how long the mouth would be open for a scream, what kind of pattern the screams had. For example, they came up with a throat movement for when the raptors make their guttural clicking sounds. So the visual and vocal development of the dinosaurs went somewhat hand in hand. [25]

Some of the most effective moments in the film are perhaps the least attention-grabbing. An example is the scene in which Dr. Grant rescues Tim from a vehicle lodged in a tree top, which occurs minutes after the overwhelming main road attack. This scene is contrastingly quiet: the rain has subsided to intermittent drips off of the leaves and distant animal noises can be heard. Rydstrom talks about his use of dynamics:

> When things are quiet in a movie, it means that you're hearing details you wouldn't normally hear. If you're trying to build tension out in the woods before a dinosaur shows up, you have everything get really quiet, then you hear leaves hitting the electric fence, or you hear certain birds, or you hear animals way in the distance....It's sort of a hyperawareness, like a drug state. Suddenly everything is incredibly sharp and detailed, but low-level. These moments are tense.[26]

Frequently Rydstrom will perform sound effects live to picture, after

[25]Ibid., 141.

[26]Tom Kenny, "Welcome to Jurassic Park: Sound Design for Steven Spielberg's Dinosaur Epic," *MIX* 17, no. 7 (July 1993): 133.

loading layers of sound into a Synclavier.[27] This was true for scenes in *Jurassic Park,* including the "impact tremors" and on-screen footsteps of the T. Rex. When watching the film it is interesting to notice the organic spacing of these sounds, which in many cases have no visual cue to indicate their placement (off-screen sound). The rhythm arrived at by this method fits naturally with the editing tempo and dialogue. Rydstrom describes the process as follows:

> I had a patch on the Synclavier with many different footsteps which were made up of an explosion and a tree crash. Additionally, a mod wheel would change the time relation between the two elements, so while performing I would move the mod wheel to create a variety of steps. Some of the roars were done this way, but then usually had to be synchronized in more detail. But the T. Rex breathing was all performed. There was a Synclavier patch with inhales and exhales arranged up the keyboard, and some breathing loops. I would be doing essentially "breath Foley," feeling what the animal was doing, and trying to fit the rhythm in between the louder vocals, i.e. an inhale would always precede a roar.[28]

A significant use of off-screen sound occurs in the raptor feeding scene. This sequence was also performed live, using a combination of dog and Tasmanian devil growls.[29] Rydstrom talks about his preference for this approach:

> Since rhythm is an indispensable element of effects cutting, performing on a keyboard can be more satisfactory than slowly cutting individual effects until they eventually make a stiff rhythm. Usually, the more organic the better![30]

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[27]Marans, op. cit., 41.

[28]Gary Rydstrom, email to author, 10 Oct. 1994.

[29]Ibid.

[30]Ibid.

The sound effects for this film, whether showcased or background ambience, are a stunning accomplishment for the Oscar-winning sound team. It allowed them the time-frame, creative freedom, and inspiration many sound designers can only dream of–and Rydstrom is appreciative of that fact:

> It definitely is one of those once-in-a-career kind of opportunities. I won't get a film like that for awhile that'll be nearly as much fun.[31]

Music

> This is a traditional and beautiful-sounding score and it creates a sense of awe that matches the classic beauty of the scenes. There's a certain majesty to it, and another part is very scary. It has to cover a broad range of emotions. Typically, music and effects people are in an unstated competition on individual scenes, but I've come to realize over the years that a good film score just makes everything I do sound that much better. And this is a very good film score.[32]

John Williams created many memorable moments with his score for this film, including the sweeping epic feeling during the first approach to the island, and the bittersweet "Remembering Petticoat Lane" cue where Hammond reveals his shattered dreams for the park. These moments, and several others in the film, could not have been communicated by anything other than music. A good example occurs in the final moments of the film. The raptors surround the characters and suddenly the T.Rex bursts into

[31]Gary Rydstrom, telephone interview, loc. cit.

[32]Kenny, op. cit., 134.

the room, seizing a raptor in its jaws. Although up to this point the T. Rex has been portrayed as villainous, one brief statement of the *Jurassic Park* theme communicates its heroism in this situation. Without that musical hint, the reaction of the audience would probably have been delayed until the characters fled the building. As it was, the response is immediate relief (and sometimes intermittent cheering).

This film contains a wealth of thematic material. The main theme contains a slow, stately string line, with chorus added later, and is first heard during the sighting of the Brachiosaur. Williams talks about this theme:

> The scary stuff for the T. Rex and the vicious raptors wasn't the hardest. I had to work more on the themes for kinder dinosaurs. They're huge, but they're also beautiful. I wanted to create a sense of the awe you'd feel seeing those magnificent creatures. There's almost a religious aspect to their music.[33]

During the journey to the island the statement of the epic theme is heard, with full brass section, as the helicopter descends to its landing pad in front of a cascading waterfall (this is the same theme that catches the T. Rex's moment of heroism later in the film).

The raptor motive is a furtive string and woodwind line, which moves into a more intense brass passage, and is heard during the opening scene where the raptor cage is being unloaded. Other melodic material occurs for various scenes including the "A tree for my bed" segment, "Remembering Petticoat Lane," and an extensive section of underscoring as Nedry steals

[33]Jeanne Wolf, "John Williams Scored 'Em," *TV Guide* 41, no. 27 (July 3, 1993): 29.

the dinosaur embryos.

The film also has two instances of source music: the first is heard during Nedry's business deal in San Jose (ethnic flavor). The second is a humorous score to the visitor center film "Mr. DNA." This cue is a clever parody of itself, capped off by Hammond's comment that "This score is only temporary, of course. It all has very dramatic music." He goes on to do his best to communicate, in humming and gestures, a John Williams score.

An interesting choice of instrumentation occurs in the final scenes of the film. A solo piano plays the theme under a close-up of Hammond's amber cane handle. It is unusual to hear a solo piano used in a film of this scope. John Addison states that:

> a piano is associated with interior, rather that exterior sounds, and secondly it is liable to sound like source music, as if someone is playing it off-screen.[34]

This is what made Williams' choice of a solo piano line in *Jurassic Park* so unusual, considering the scope of the film and the richness of the score. However, in that moment a sense of intimacy contrasts with the grandeur of the orchestral arrangement that follows it, and the more forceful moments that preceded it. Perhaps the music is communicating the idea that such a simple and beautiful thing, the hunk of amber with the insect trapped within, was used to create such chaos. In any event it is a singular and poignant moment, that shows how rules can often be broken to good effect.

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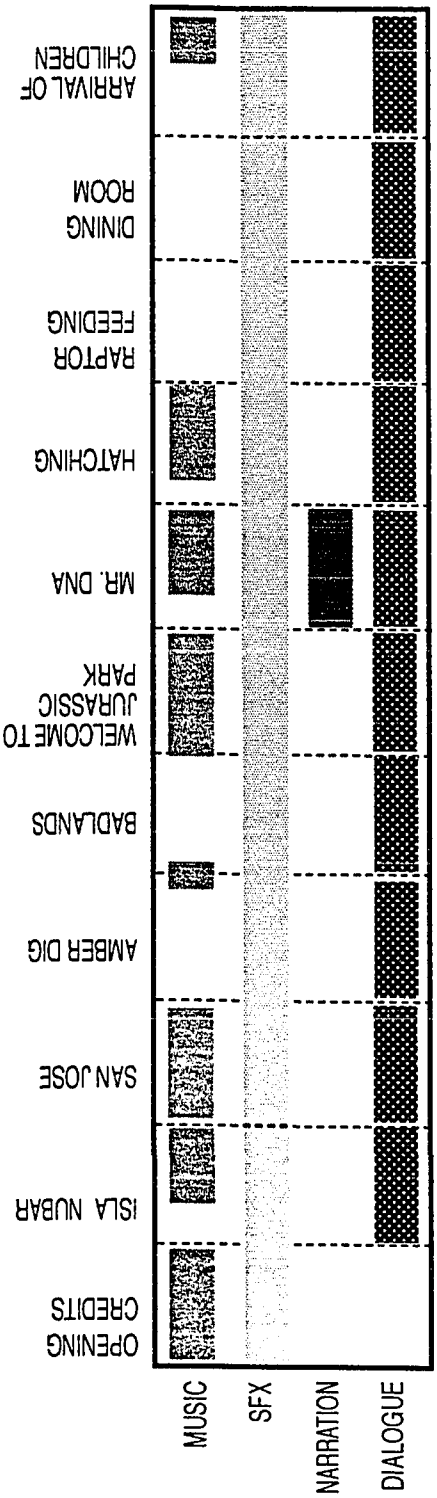
[34]John Addison, in Tony Thomas, *Film Score: The View From the Podium* (New York: A.S. Barnes and Co., 1979), 203.

Interaction Analysis

The interaction of the sound effects and music occurs on many levels. Sound effects perform the function of realism, including interaction, off-screen space, and locale. They also function psychologically: the jungle ambience components change subtly depending upon the circumstances of scene and the dinosaur noises create a response in the audience. A narrative function is performed by the sound effects during the T. Rex attack, where the impact tremors become a character signifier. In addition, many of the dinosaurs are introduced first as off-screen sound, including the raptor's first two "appearances."

The music duplicates many of these functions, including affective states in the audience and conveying character emotion (during "A tree for my bed" and "Remembering Petticoat Lane").

Even with the overlapping functionality there are very few instances of competition in the film, due, in part, to creative use of the THX surround sound space, which allows for precise, discreet placement of sonic events. Even when the soundtrack is heard on a home television speaker, although there is substantial loss of dynamic range, the soundtrack is still communicated clearly. A careful use of frequency ranges (by both the composer and sound designer) and the positioning of "dead zones" where scenes with dialogue and quiet sound effects contrast with louder moments occurring before or after, ensured a consistent performance across "platforms." Figure 6 shows these elements in the opening scenes.



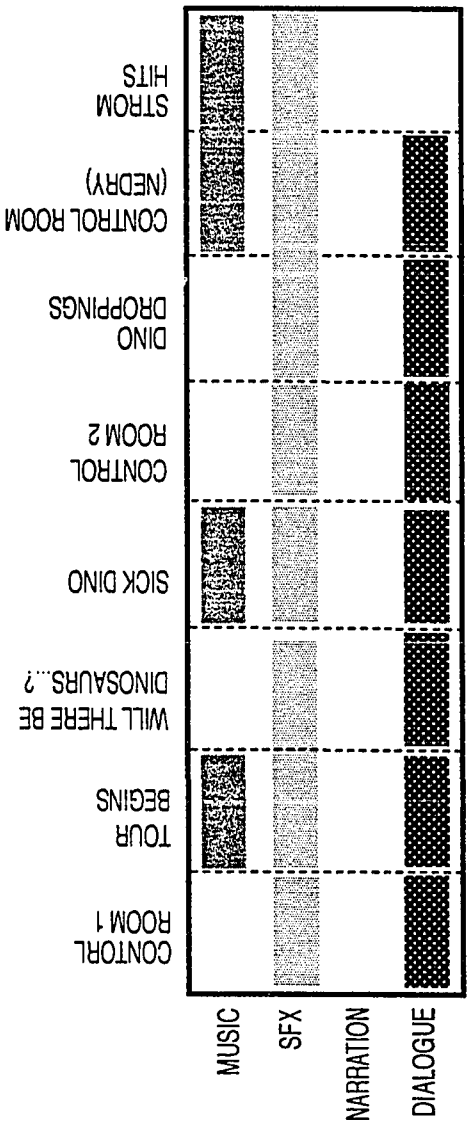


Figure 6

Jurassic Park Soundtrack Diagram

Isla Nubar (unloading the raptor cage)

The first scene in the film is of trees thrashing wildly as though moved by some powerful unseen force. The sound effects play alone at first with a thunder-like sound and a growling, crunching noise in a low frequency. This sound is intentionally ambivalent: not quite animal or machine, intended to produce a feeling of expectancy.[35]

The underscoring begins with an ostinato bass line, which unfortunately enters at a moment where the sound effects are starting to make the transition from ambivalent animal sound to identifiable machine sound. The bass line, in the same frequency competes with the low end of the sound effects, and distracts the ear just long enough for the point to be obscured. Gary Rydstrom talks about this scene:

> The opening was harder to get right. There's the growl in the jungle that turns into a forklift. That means that it has to be at a certain level to hear that. At the same time John Williams is sneaking his score in–right at the time that the forklift is coming out of the woods–and he's sneaking it in real low. So right off the bat there was kind of a conflict there. So we never fully developed the whole growling-forklift idea.[36]

As the raptor cage emerges from the trees, chords are added to the bass line. This may have made a more effective entrance, giving significance to the revealed object without confusing the sound effects "set up." As it is,

[35]Rydstrom, telephone interview, loc., cit.

[36]Ibid.

there is a redundancy in functionality, since both sound effects and music are initially trying to create suspense, and competition in frequency range where the low bass line interferes with the rumbling growl.

The first appearance of the raptors, in this scene, is with off-screen sound effects (this is also true later in the film, as the T. Rex is introduced first with impact tremors, then with a growl just before his massive head comes into view). This gives the sound effects a great amount of power to set up an expectancy about the creatures. As Gary Rydstrom states:

> You don't see the dinosaurs as well as you hear them for the first part of the movie, which is an interesting way to introduce their character.[37]

T. Rex Main Road Attack

This scene is broadly recognized as being a tour-de-force in sound design. Since the scene is sound effects and sparse dialogue only, the interaction is autonomy, with effects being used for both emotional response and realism. Figure 7 sketches out a few of the opening elements of the montage that kept audiences on the edge of their seats for almost ten minutes.

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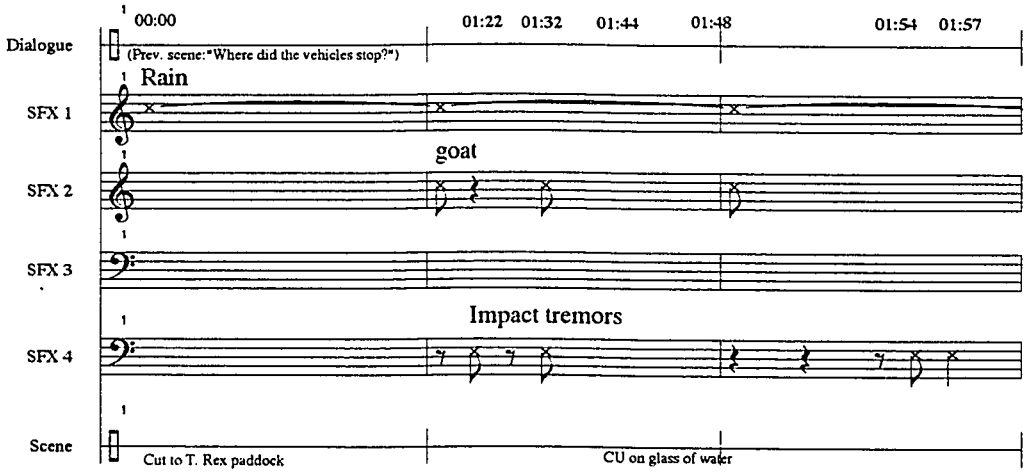
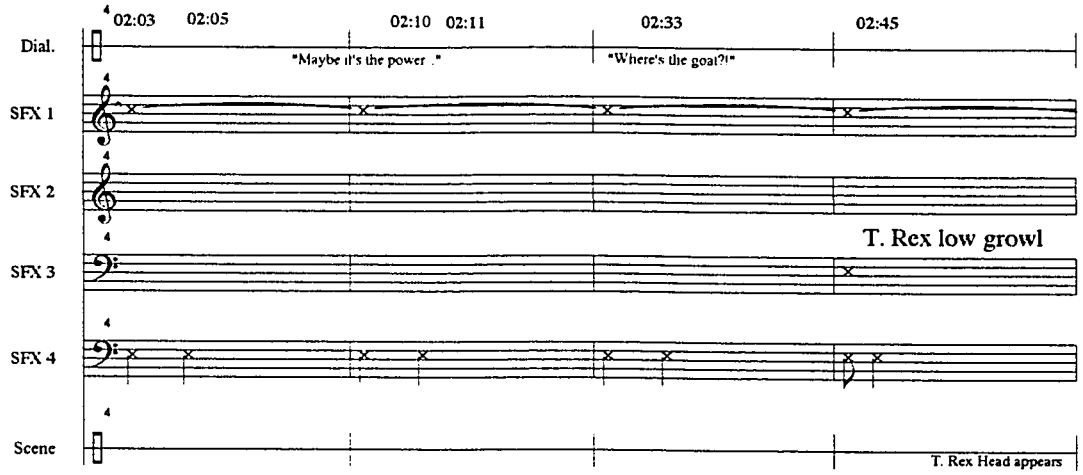
[37]Kenny, op. cit., 130.

Figure 7

Jurassic Park Soundtrack Score

Main Road Attack





Transcription by author taken from the film

Gary Rydstrom feels that Spielberg's decision to make this scene sound effects only was an obvious one. As he states:

> It seemed it needed a sense of realism and sometimes the lack of music makes it seem more real, more scary, more in-your-face. It just has a raw side to it.[38]

Rydstrom went on to state that due to the number of elements in the scene, including rain, screaming children, a car being demolished, and the dinosaur roars, that the dynamic range would not have been available if there was also music.

This scene proves that sound effects can be very effective in producing an emotional response in the audience. When this author saw the film for the first time, the fact that there was no music went entirely unnoticed. Upon viewing it a second time the reaction was one of astonishment: the assumption that music was there was based upon thinking it must have been in order for the scene to be that exciting. As has been discussed previously, that is no longer necessarily true. This scene has provided a high visibility opportunity for sound effects to "show their stuff" to the industry. Even so, Rydstrom states:

> It's such a showcase that I'm disappointed completely in it. I would have loved to spend weeks and weeks tweaking with that and putting other sounds in and playing with it. But though we had lots of time editorially on this film, we had a very quick schedule on the mix. We had 11 days–which is awfully fast. And we had to fly to Paris twice to show it to Spielberg. It was one of those things where it was such an opportunity that you're never going to be entirely satisfied with what you make of it.[39]

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[38]Rydstrom, telephone interview, loc. cit.

[39]Ibid.

Raptors in the Kitchen

John Williams consulted with the sound designer about this scene. Rydstrom states that Williams seemed most concerned about the register of the raptor noises and the rhythm of the sound effects.[40] A copy of the scene with sound effects was made for Williams. The resulting cue is very sparse and subtle in its use of space and frequency. Particularly effective is the use of low woodwinds when underscoring the raptors' clicking claws. This is a good example of augmentation: the music conveys the ominous significance of the visuals and the sound effects convey the realistic interaction of the characters with the environment. The combination, each keeping to a different frequency range, created very tense psychological moments. Throughout, Williams kept his orchestration for the most part in the lower ranges, out of the way of the sibilant hisses and clicking claws. Moments when the raptors vocalize are left clear in the score.

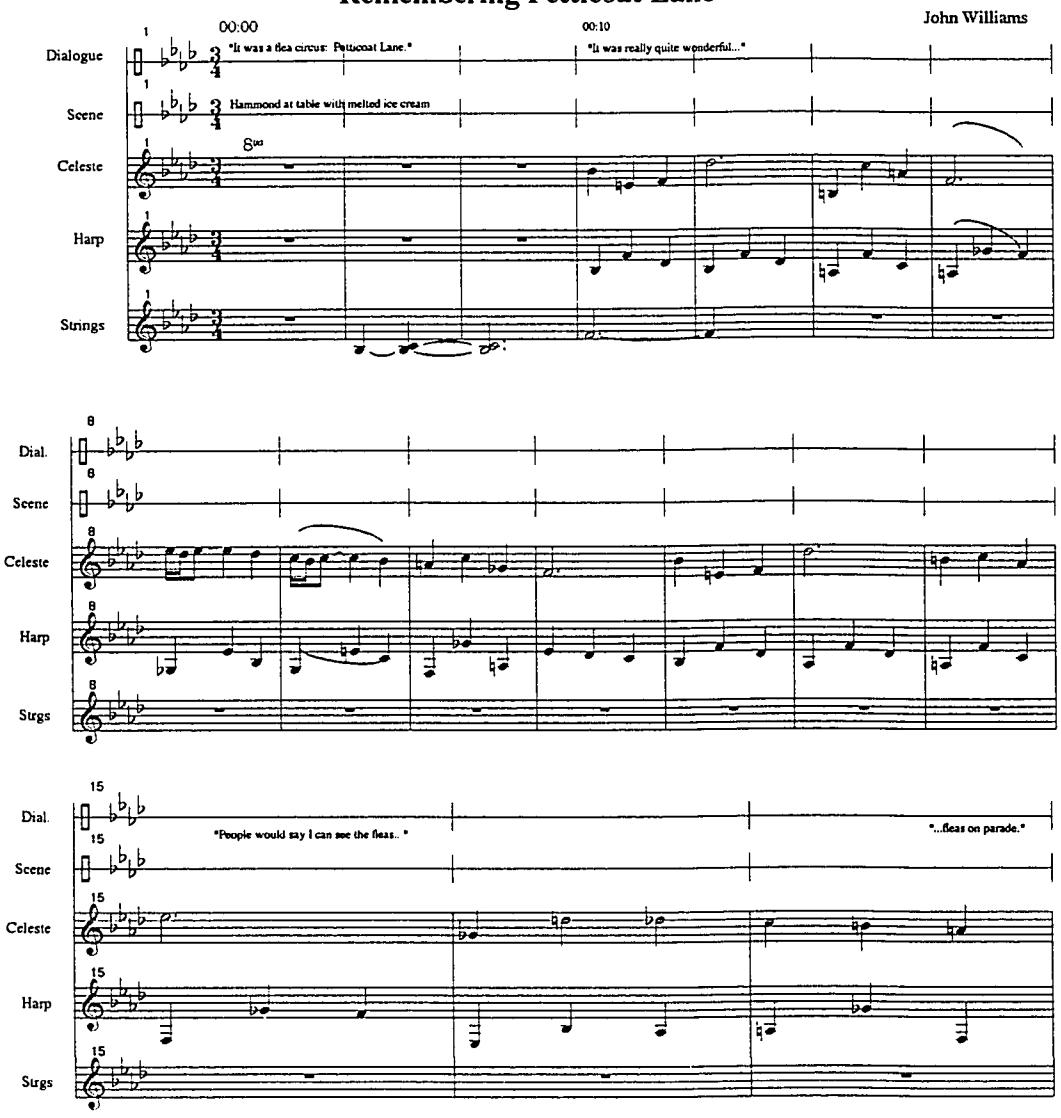
Remembering Petticoat Lane

The scene in the film with Hammond forlornly eating his melting ice cream is such a fine example of underscoring dialogue that it seems, at times, as if the dialogue was written to the music instead of the other way around. An excerpt of the cue is notated in Figure 8.

[40]Ibid.

Figure 8

Jurassic Park Soundtrack Score



Transcription by author from the soundtrack CD (MCA Records)

The texture of the cue is kept very light. The instrument ranges float above Hammond's voice. A beautiful moment occurs after Hammond says "Fleas on parade." As the melody repeats, a high violin line comes in and floats above it for a few beats while he says "But with this place I wanted to show them something that wasn't an illusion." In that moment, a glimpse of his dream is made clear, and for the first time in the film the character has depth beyond that of a rich buffoon.

The melody ends under Hammond saying, "I mean, not devoid of merit." At this point Ellie speaks and lower instrumentation comes in which is out of the range of her voice. Her speech concludes with "So...it's good," as she tastes the ice cream, and the original melody fades in gradually, almost as if it had been there all along. The cue ends right after Hammond says, for the last time in the film (but the first time without glee), "Spared no expense."

7th Guest

Trilobyte, a new subsidiary of Virgin Games, released *7th Guest* as its first product. It is a very ambitious and ground-breaking CD-ROM game, with stunning graphics and a masterful attempt to create a filmic environment. *7th Guest* manages, during its best moments, to wrap the participant in a mood created by combined images and sounds. The elegance of the interface, where a ouija board substitutes for the usual Macintosh or Windows menu, and animated icons in keeping with the

theme of the game are used for navigation, is a rare instance of consistency between style and functionality.

Unlike many similar products, the soundtrack was an important consideration from the beginning of the project, as is demonstrated by the following extract from the original design specification:

> In the case of Guest, the story is the mystery as well as the final puzzle. Therefore, a good deal of effort will be put into the creation of a powerful and surprising story. Sophisticated graphics, captivating animations, and mood enhancing music serve to emphasize the dramatic impact.[41]

This document also detailed the audio considerations:

> The Hyper Movie is heavily dependent on aural effects to convey information and mood. Hotspots often have associated sound effects or musical themes. The audio level is kept low throughout most of the game. This will force the player to turn up the volume control. At certain key points, animations will be played accompanied by loud music/sound effects. These will be for shock value....The music is all important in setting the mood. Besides using traditional musical themes, much of the scoring and orchestration is somewhat abstract, designed to create eerie sound effects.[42]

It is interesting to note the above comment about audio level in the game, since audio balance problems have plagued the product in both PC and Macintosh platforms. The personnel involved with the creation of the soundtrack encountered a variety of platform obstacles which made the process problematic. Apart from the forgivable timing and audio balance

[41]Rusel DeMaria, *7th Guest: The Official Strategy Guide* (Rocklin, California: Prima Publishing, 1993), 344.

[42]Ibid., 353.

errors having to do with the designers' decision to combine digital audio, GM support, dialogue and sound effects (without the equivalent of a final dubbing session where relative levels could be locked in), there were some preventable mistakes in the choice of music cues under the dramatic scenes. This may be due, at least in part, to the arcade-style game background of the composer, George (The Fat Man) Sanger (discussed in more detail later).

In *7th Guest,* separate sound effects and music files were triggered during the course of the game. This led to inconsistent timings and levels on various platforms. To solve some of these balance and synchronization problems, the soundtrack for the sequel product, *11th Hour,* was dubbed to a stereo mix where all the elements (at least in the problematic dialogue scenes) were balanced. This mix was then segmented into smaller pieces, to insure a consistent relationship between dialogue, effects and music. The designers at Trilobyte were asked if this seemed to be the solution that they will continue to use in the future. The response was:

> Yes. Breaking a soundtrack into smaller pieces accomplishes several things. First of all it allows us to reveal the story in a more timely fashion, tying music to the situations appropriately, so that the dramatic impact is emphasized. It also makes the files smaller, easier to handle, and faster to load– all of which makes the experience more fun, less frustrating and better.[43]

When this author spoke with Sanger about his work on *11th Hour,* it did not seem that his approach to instrumentation under dialogue had evolved since *7th Guest.* Therefore a certain amount of conflict between those elements will likely remain in *11th Hour.*

[43]Kellyn Beeck, e-mail to author, 15 July 1994.

User annoyance is a serious consideration with game designers. It is unfortunate that, possibly due to the primitive audio quality in the early games, that many users turn the sound off when that option is available. When one realizes that in many cases a player may be stuck playing the same segment of the game for days or even weeks, another important difference between game soundtracks and film soundtracks is made clear: time-frame. Ron Gilbert states:

> If I could have my way, I'd design games that were meant to be played in four to five hours. The games would be of the same scope that I currently design, I'd just remove the silly time-wasting puzzles and take the player for an intense ride. The experience they would leave with would be much more entertaining and a lot less frustrating. The games would still be challenging, but not at the expense of the player's patience.[44]

Brenda Laurel talks about the annoyance factor:

> Several rules of thumb should be used in choosing sounds to reduce annoyance. The most important axiom is that familiarity breeds contempt. Repetitive audio messages of all types quickly become tiresome. Auditory messages should always be as varied as possible....Another heuristic is that musical sounds and phrases are more likely to distract and irritate people than everyday sounds. Auditory interfaces should form a natural extension of everyday auditory environments.[45]

When readers responded to a survey posted by this author on a computer network Usenet group (see Appendix C), the most frequently cited annoyance factors in *7th Guest* were the repetitive narrative phrases,

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[44]Ron Gilbert, in Brenda Laurel, ed., *Computers as Theater* (Reading, Massachusetts: Addison-Wesley, 1991), 96.

[45]Brenda Laurel, ed., *The Art of Human-Computer Interface Design* (Reading, Massachusetts: Addison-Wesley, 1990), 332.

where Stauff "heckles" the listener in a sarcastic way during the solution of various puzzles. An example is the phrase "Feeling lonely?" that triggers each time a player encounters a dead end in the maze. Other phrases, such as "We'll all be dead by the time you solve this," are humorous at first hearing, but due to the complexity of the puzzles, many players (this author included) heard the same phrase dozens of times.

The music files are subject to the same level of user annoyance, although it is more difficult to focus on one subjective factor that may be the cause. In implementing the score for the product sequel, *11th Hour,* composer George (The Fat Man) Sanger states that he created longer loops, to ultimately allow for fewer repetitions of the material when the user is "stuck" on a puzzle.[46]

The designers at Trilobyte also feel that the approach of smaller audio segments, implemented with *11th Hour,* will eventually allow for more interactivity. Kellyn Beeck, Vice President at Trilobyte, relayed this information:

> This approach also allows the game to respond and change music in a situation depending on the course of play. If the player is solving a puzzle, the music can offer a reward–if the player is having trouble, the music can offer encouragement. This area has not been explored in our games, but is an approach we may implement in the future.[47]

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[46]George Sanger, telephone interview, 4 Aug. 1994.

[47]Kellyn Beeck, loc. cit.

Sound Effects

Sound design credit on *7th Guest* is given to Web and Greg Staunton. This author interviewed Web Staunton about the project.

> They did give us the initial script. We got four or five versions of the script as things went along. They would inform us when certain scenes had been cut. That was kind of how that worked. We went through and dissected the script; every sound cue, every music cue, every minimal effect, was catalogued and given a number.[48]

Some of the sound effects used in this project were taken out of the Virgin Games sound effects library. Staunton was also responsible for recording the production sound tracks for the dramatic scenes, and was able to get additional sound effects (vocalizations, etc.) during that process. In addition, much of the dialogue had to be replaced in a process analogous to ADR, but without the synchronization issue.

The final dialogue and sound effects mix was delivered on DAT, which was downloaded into digital files. The difficulties in triggering these files in a way that produces a synchronized soundtrack is an area where creative preference loses out to hard technological truth. Unlike film, where the soundtrack is locked with the picture in the dubbing session, computer media often recreate the soundtrack in unexpected ways with each new platform. For sound designers accustomed to working with fixed media (such as film and video) this reality is unpleasant. Staunton states:

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[48]Web Staunton, telephone interview, 6 July 1994.

> I was concerned about that just because not every computer responds the same to a trigger. When I saw it the first time, it was real frustrating because there were a lot of real critical timings, in my mind, that are way off.[49]

Music

George (The Fat Man) Sanger composed all the music for *7th Guest,* although some of the actualization of the cues was done by other members of his production group (Team Fat). The music included in the game was a combination of MIDI files, using the GM standard, and digital audio files.

Peter McConnell, of LucasArts Games, states that all game music is divided into four categories: themes, ambiences, episodes and flourishes.[50] A theme is usually a memorable bit of melody that announces a character or a situation. An ambience is background music, with no strong melodic content, used to create mood when the player may be engrossed in a long process of solving a puzzle. Episodes follow a sequence of events or serve as a reward for solution of a puzzle. Flourishes are almost like a sound effect, hitting a key event.

The majority of the music in *7th Guest* is ambience, musical wallpaper for the "mansion" environment. There are also episodes throughout the game play (which George Sanger named FATs, for "finite amounts of theater"). These short dramatic scenes are offered as rewards for solving a puzzle.

[49]Ibid.

[50]McConnell, Peter, questionnaire from author, 1 June 1993.

The designers at Trilobyte were asked at what point the composer became involved in the project. The response was:

> In *7th Guest,* the Fat Man was brought in after the video shoot, and began developing the music to support the work being done on the video and graphics. In *11th Hour,* he began work on the music at a similar point in the project, two months after the video shoot. Working on specific pieces, he tailored them to suit the final edit of the movie footage.[51]

Sanger describes the final stages of his work as follows:

> The intro was actually the last thing I did for the game, because it really depended on their having a lot of processes completed. They had to have everything shot on blue-screen, and everything had to play back on a computer. They had to have it all down. So they flew me out for 10 hours to do a sanity check on the game, and I wrote the last bit of the intro out there. But when I actually wrote it, I wrote it off of the video tape and most things on the video tape had very rough mixes of what the audio would be like. A lot of times they replaced the dialogue entirely, changed the sound effects, or put in different sound effects.[52]

During the course of this "sanity check" Sanger feels that they dealt with the issue of balance only superficially, due to time constraints. There had been no prior discussions between composer and sound designer, or game designer about audio balance between dialogue, sound effects and music. When asked about his involvement in this area, Sanger replied:

> Balancing? Mixing was not part of my job description for *7th Guest.* Just to write tunes to specific bits of video.[53]

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[51]Kellyn Beeck, loc. cit.

[52]Sanger, loc. cit.

[53]Ibid.

Sanger's experience working with dialogue has been limited to projects where spoken phrases were stored as files that he never actually heard. *7th Guest* was his first experience composing to scenes that had dialogue.[54] Although in *7th Guest* he only had control over the music component of the soundtrack, in *11th Hour* he was able to do a pre-mix of the music under the rough dialogue mix, which he describes as follows:

> Where I had control over the mix was on the music side of *7th Guest,* and to a large extent, in the FATs in *11th Hour.* But I didn't get to set the total volume of that, I just kinda set how it fluctuated, where it dips, where it comes up, where it goes down, how loud parts of the music are compared to other parts of the music. But I mixed that also under a rough take of a rough voice. There's some stuff where the voice was real low, and I've just got to assume the voice will be louder on the finished product. It wasn't possible to get music under it, and it's so low that it just sounds like a mistake. So I've just got to trust Web to catch that, and I'm pretty sure he did.[55]

It is worth noting that even though Sanger had the dialogue tracks available to serve as a guideline for relative volumes, that he made no attempt on either project to modify his music to better accommodate the dialogue. This is where the greatest problems occur, illustrated by the following example: in *7th Guest,* after solving the piano puzzle a FAT is shown where a complex improvisational piano line is playing under the dialogue, interfering with intelligibility. A film composer might have punched a hole for the dialogue, either in frequency, or in time. When Sanger was asked about his awareness of these types of issues during his composing for *7th Guest,* he said that he felt that he was limited by the

[54]Ibid.

[55]Ibid.

systems not being "in place." He continues:

> We're starting to get to where we're not just asked for timing, we're starting to get cases where you have some dialogue to time to. A lot of it is we don't have the information because we don't have the system to get the information.[56]

Eric Huffman, of Virtual World, has another perspective on the issue of systems not being in place. He states:

> One of the things that's interesting is that people in film and video are pretty sophisticated about sound concepts. There are directors and producers who are sophisticated, but they aren't all. People in the game industry are even less so. I think it's amazing that a lot of really sophisticated stuff is happening in terms of visual technology. The audio technology is just beginning to catch up. But it's not so much that the technology is not there, it's more that people's understanding of it isn't.[57]

Since the film composer's ability to underscore dialogue is not a negligible craft, one might imagine that very few musicians who have been working in the realm of "non-talky" games for any period of time, would have the necessary skills. However, the fact that a composer started out writing wall-to-wall game music does not necessarily mean that those skills cannot develop. When LucasArts composer Michael Land was asked what kinds of considerations he has in dialogue sections, he responded:

> Well first of all, there's what we call auto-dipping, which is a gradual lowering of the music's volume 60 to 70% a little before the dialogue comes in, and bringing it gradually back up when the dialogue goes out. The second thing is to be conscious of orchestration and instrumentation, more so with voices that can't cut through and less so with voices that can. For example in TIE

[56]Ibid.

[57]Eric Huffman, telephone interview, 13 Sept. 1994.

> Fighter we have an evil Emperor who has a feeble voice. So when we listen to it we might hear that the string line needs to get pulled out. It's the same thing as in film.[58]

Land was then asked if this film sensibility was something he has studied, or if it came from the fact that Lucas is a film-based company, with many of the games being film-derived. His response was:

> No, I think it's just common sense. You just look at the elements you are putting together. There's an inexorable logic about it–you don't use frequencies that conflict with each other. There's really no other way to do it.[59]

In the case of the FAT in *7th Guest* described above, there were several considerations that might have improved the results which have no dependency upon hardware limitations. For example, because of the long shots in the dramatic scenes, and the method for accessing the sound files, the dialogue is asynchronous, more akin to a series of voice-overs than actual dialogue. In Chapter Three, guidelines for underscoring dialogue were suggested. One of these was a concern that voice-overs are more difficult to understand than dialogue, since the audience cannot lip-read.[60] Other considerations discussed were: smooth textures can be less intrusive; underscoring must keep out of the vocal range; accents and solos can be distracting; try to avoid extreme highs and lows; do not overwrite.[61]

None of these guidelines were followed in *7th Guest.* In the music

[58]Michael Land, telephone interview, 8 Aug. 1994.

[59]Ibid.

[60]Fred Karlin and Rayburn Wright, *On the Track: a Guide to Contemporary Film Scoring* (New York: Schirmer Books, 1990), 128.

[61]Ibid., 132.

room FAT the frantic piano improvisation and percussion parts call attention to themselves, and away from the dialogue; the music is full of accents and features a piano solo; every frequency range is fairly saturated; the cue is about as overwritten as it could possibly be. It is of little surprise there were comprehension problems in this and similar scenes throughout the game.

The critical issue in *7th Guest* is best phrased by Kellyn Beeck, at Trilobyte, when he states:

> Music created an eerie feeling in the *7th Guest;* it was a background element that underscored the feeling we desired the player to have.[62]

Unfortunately, in many cases the "background element" was in the foreground–and was doomed to be so because of the way it was written. The result was constant competition for the player's attention.

Interaction Analysis

The events in *7th Guest* can be divided into six categories: opening scenes, closing scenes, dramatic scenes, puzzles, events, and exploration. Examples of each of these will be analysed here. The soundtrack contains dialogue, music (in both GM and digital audio formats), sound effects (generally spot effects for specific events), and narration (either Stauff or "ego"). The combination of these elements are shown in Figure 9.

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[62]Kellyn Beeck, loc. cit.

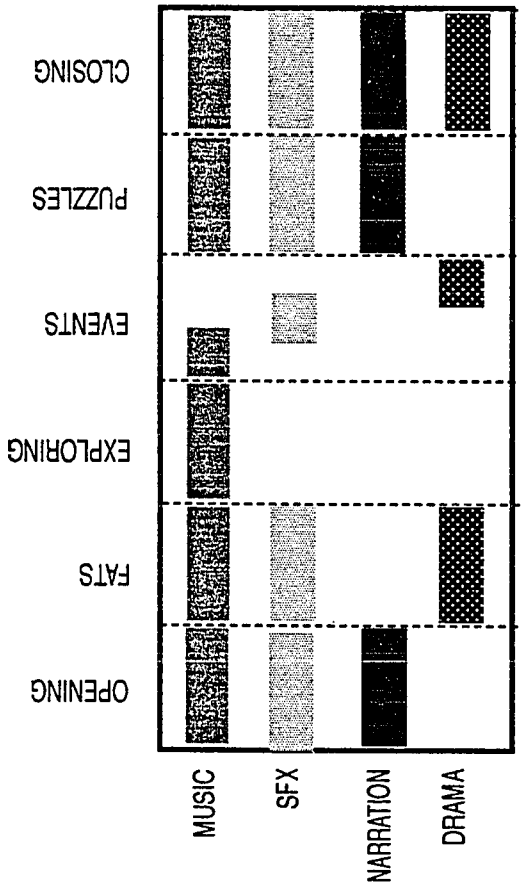

Figure 9

7th Guest Soundtrack Diagram

Due to the nature of the medium, files are often triggered differently during successive game plays. As a result, a precise analysis of synchronization issues is not possible. Instead, events will be discussed in terms of their potential interaction during the segment.

Opening

When the player clicks on the *7th Guest* icon to begin the game, the screen fades to black. A ouija board appears as a MIDI music file plays, and, on subsequent plays, Stauff says, "Back for more?" and laughs. The music file ends with clock ticks that play alone for a few measures and then stop. If the player has not initiated any further action, another MIDI music file is called up. These two files are used similarly during any pauses in the puzzle solving and exploration throughout the game play.

When "start new" is selected the screen again fades to black. Dedication screens and animated logos for Virgin and Trilobyte are shown while a music file plays. The game opens with Stauff's mansion and lightning flashes (no sound effects). The opening credits are run with a MIDI file.

The story of Stauff is told with animated book pages, each page accompanied by its own music file (digital audio). There is narration for each story segment, and occasional sound effects such as clinking wine glasses and coughing.

After the storybook sequence ends, the POV pulls out from the book and back, to reveal the Library. As this happens the last music file ends with a

simple solo line. The POV travels out of the room and through the entry, stopping in front of the front door.

The introduction of characters begins in short dramatic scenes that each have a musical cue (MIDI files). At the conclusion of the last dramatic scene, the POV turns around to the base of the staircase. Narration by the character called "Ego" says, "How did I get here? I remember...nothing." An animated skeleton hand (cursor) waits for the player to proceed while a MIDI file plays continuously during the period of inactivity.

The player is encouraged by a beckoning hand to move into areas that are available for play, and warned, by a shaking finger, that entrance into some areas is not yet allowed. In a process of trial and error, the player proceeds through the series of puzzles.

FAT

After solving the piano puzzle in the music room, a maniacal improvisational piano line is heard, with other instrumentation. Since the piano is in the same range as dialogue in the dramatic scene, the level of intelligibility drops.

A seduction scene with a rhumba-like musical cue occurs after solving the bedspread puzzle. This FAT is another example of competition, since muted horns and percussion obscure the dialogue to the degree that only fleeting phrases can be understood.

Exploring

As more and more of the mansion becomes accessible after solving the puzzles, it is possible for the player to wander through the rooms, revisiting puzzles in some cases (such as the maze) and experiencing events. In some instances a short dramatic scene will be played out when revisiting an "old" room. During this exploration, with the exception of the special scenes, the ambience music files continue to play.

Events

Several events, separate from solution of the puzzles, are available throughout the house. One of these is a painting at the top of the staircase. Clicking on it triggers an animated sequence in which a pair of hands is seen pushing from the back of the canvas, as if trapped behind. A short ascending music cue plays during this event, which is also used when the player encounters a dead-end in the maze.

Another event occurs in an upstairs bedroom, accessible only after the required puzzles have been solved. This event is sound effects only: moans and squeaking bed springs illustrate the culmination of a seduction scene that occurred earlier in the game play.

Puzzles

Many of the puzzles are very time-consuming, which means that the accompanying MIDI music files and narration may be heard dozens of times before the player can move on. In general, however annoying this may be, it does not interfere with the game play.

An exception to this is the piano puzzle. Since, in order to solve the puzzle, the user must repeat the musical line being shown one note at a time on the keyboard (similar to the game "Simon"), the sound of the notes is critical user feedback. However there is MIDI music playing throughout this segment, just as it does for the other purely visual puzzles. This makes the game play more difficult, and certainly less enjoyable, since in most instances the notes in the puzzle and the notes in the MIDI file are quite dissonant with each other.

This author experienced a "bug" upon one occasion, where the MIDI file did not load. The game play was much more pleasant as a result. One wonders if the presence of a MIDI music trigger in this location was an oversight, or a cruel trick on the part of the designers? In either case, the resulting musical mayhem detracts from the experience.

Closing

The final FAT in the attic contains Ego's narration, dialogue segments, as well as a complex musical cue featuring choral textures, harp

arpeggios, bongos, and processed vocalizations. The resulting confusion means that there is great difficulty in making sense of what is being said.

After the scene concludes, Tad says "You saved me. It's all been changed, now and forever." During most plays this segment is spoken with no musical accompaniment.

The closing animation (a shower of white light) also plays without sound, and leads to the final page of the book ("The End") seen in the introduction. There is silence while the MIDI file loads, then it plays under the closing credits. There is no synchronization with this final cue: the music generally ends before the credits do. Then the player is returned to the ouija interface.

Haunted Mansion

Stories were developed in the early days of planning this attraction in an attempt to give the show cohesion. One early idea was that the narration would be spoken by a raven.[63] Even though that plan was abandoned in favor of a disembodied "Ghost Host" narrator, the raven still appears in a few locations (the exact number of which has inspired frequent trivia questions among Disney fans). Each time the raven appears, it corresponds to one of the narration zones, where the Ghost Host now talks on the speakers in the doom buggies.

This "travelling narration" is broadcast to the vehicles using FM

[63]Xavier Atencio, telephone interview, 20 July 1994.

signals, which allows a fairly close synchronization with the scenes being passed. There is however a need to duplicate the same segment in successive groups of doom buggies (so that every guest gets approximately the same show).[64] The result is a type of echo, as the narration repeats down the line, most noticeable in the hallway with "Shhh...listen!" The other soundtrack elements are placed in various speakers, either point source specific for a certain scene, or diffused for background music.

There is great potential for sonic competition in these attractions due to the open space in which they are constructed. Techniques were developed to avoid creating cacophony, including synchronization of music tracks (discussed later in the music section) and implementation of "dead zones" between scenes.

This concept of a dead zone is utilized for Disneyland parade audio, where several floats share a theme and a substantial space (as much as 60 feet) separates the different soundtracks.[65] The *Haunted Mansion* soundtrack modifies this same dead zone idea by having scenes containing music buffered by those containing sound effects and narration. Figure 10 illustrates the placement of elements in the ride.

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[64]Glenn Barker, telephone interview, 28 Sept. 1994.

[65]Malcolm Howard, "The EuroDisney Project," *Sound & Communications* 37, no. 5 (May 20,1991): 45.

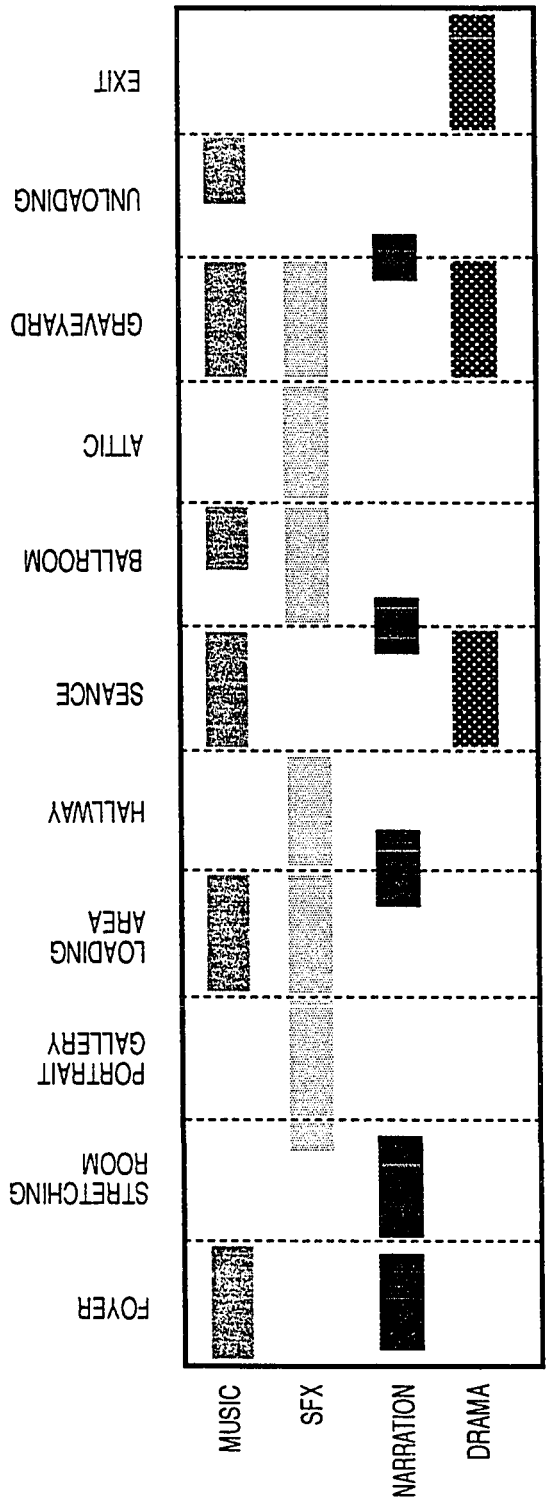

Figure 10

Haunted Mansion Soundtrack Diagram

Sound Effects

At Walt Disney World's Disney/MGM Studios Theme Park, an attraction called *The Monster Sound Show* demonstrates the use of Foley and sound effects in film. The most notable thing about the attraction, however, is found in its waiting and exit areas, where guests are treated to a posthumous introduction to sound effects master Jimmy MacDonald. In a short video segment taken from his appearance on the *David Letterman Show,* MacDonald demonstrates some of his devices and techniques, elegant in their simplicity. In the exit area, many of his contraptions are hung from the wall, and the guests can try their hand at creating "four-legged horses" with coconut shells, after watching a demonstration tape by MacDonald.

MacDonald's work in animation was discussed earlier, but he also worked on many of the theme park attractions including *Pirates of the Caribbean* and *Haunted Mansion,* utilizing his vocal and mechanical talents for sound effects ranging from animal noises to wood creaks.

Composer Buddy Baker states that he had a very close collaboration with Jimmy MacDonald on the *Haunted Mansion* and many other projects involving sound effects used as music.[66] The result was that there was sometimes a blurring of the two elements, that sometimes resulted in unpredictable usages. A good example of this, the pitched wind sound in the loading area, will be discussed later in the analysis section.

[66]Buddy Baker, telephone interview, 28 July 1994.

Music

As was mentioned earlier, a theme song in animatronics can serve to mitigate the emotional impact of the experience. Disneyland's *Pirates of the Caribbean* provides a good example of this. The attraction depicts scenes of amorality and violence, using sound effects which are realistic enough to lend verisimilitude to the technological trickery. If one can imagine adding more realism–for instance women crying piteously as they wait to be auctioned, or people screaming in terror as the village burns around them–the impact of the attraction would be one of grizzly realism, a chamber of pirate horrors. The song tempers the realism by providing a light-hearted contrast to the scenes.

> Music can build tension in commonplace scenes or ease it in ones that have become visually too frightening.[67]

Throughout the plundering the refrain "Yo Ho, Yo Ho, a Pirate's Life for Me," encourages the guests to join in with what must be, after all, just good clean fun.

During the development of *Haunted Mansion,* one faction was in favor of presenting a truly frightening experience, and the other was in favor of lessening the fright for the younger guests. This fright/light contest was eventually won by the lighter side, and:

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[67]David Tietyen, *The Musical World of Walt Disney* (Milwaukee, Wisconsin: Hal Leonard publishing, 1990), 10.

> A call went out for a merry upbeat song in the same "spirit" as "A Pirate's Life for Me.[68]

The song "Grim Grinning Ghosts" makes ghoulish goblins and shrieking skeletons good-natured fun in just the same way that the refrain "Yo Ho, Yo Ho" did for the pillaging pirates. Although much of the attraction is quite evocative and frightening, the "finale" in the graveyard, with the animatronic characters singing along, lightens the mood considerably. Joe Herrington states that in the case of *Haunted Mansion,* "the music helped very much to make that a 'G' attraction."[69]

Buddy Baker composed the melody to Xavier Atencio's lyrics. The song is the main theme for the musical score, which Baker composed, orchestrated and conducted, including all of the "source music" cues in the final graveyard scene.[70]

In film, a composer gets handed a final cut with picture and dialogue all locked together, and from that the timings for the cues are derived. With animatronics there are generally different cues for different scenes that a "never ending" audience passes through. Every scene is therefore running continuously and simultaneously, which creates a concern about sound leakage from one scene to the next.

A logical approach to this challenge was developed for *It's a Small World.* Originally, Baker states, Walt Disney wanted children's tunes

[68]Randy Bright, *Disneyland: Inside Story* (New York: Harry N. Abrams, 1987), 204-205.

[69]Joe Herrington, telephone interview, 8 Feb. 1994.

[70]Baker, loc. cit.

from around the world in this attraction, but because of the large open physical space this would have resulted in a chaotic acoustic jumble. Baker describes the solution to the problem:

> We came up with the idea of playing the Sherman Brothers' tune in sync but giving the treatment of each country it's own flavor as you go through. Actually, you're in the boat and you become the fader between each of those. They're all at the same level in there. Now when you leave France you start picking up Germany and France fades out because it's not playing so loud that it leaks all through the German thing. Each of them are balanced out that way, so there's no change in levels and they are all exactly the same length.[71]

This system became a model for the development of many later attractions, including *Haunted Mansion.* That soundtrack features a more subtle use of the basic track, which is not heard in its entirety until the graveyard scene near the end of the ride. By that point, the guest is usually not aware of how much of the previous material has been locked into that rhythm. Baker describes the synchronization technique in the graveyard scene:

> The way that worked: the whole track, each of the original 42 tracks I had going in there were all designed based on 90 feet, which is one minute. So each one was the same length, and the chords were happening at the same time. That whole graveyard is all the same tempo. There's different versions for each little scene in there.[72]

The basic rhythm tracks, therefore, play under a constantly changing foreground of "soloists" such as the opera singers, or the "Singing Busts," that come into prominence as the individual speakers are passed. Less

[71]Ibid.

[72]Ibid.

noticeable is the fact that the organ cue in the Foyer at the beginning of the ride is also locked into this same basic track, as is the "Great Hall" cue in the loading area, the seance music, and the choral music at the exit.

The rhythm of each cue can be cut in half, for a slower tempo, or doubled for contrast, just as long as the overall length and harmonic changes stay the same.[73] A guest will never come from one cue to the next and hear any dissonance in the music, since the harmonic changes will always line up from one scene to another. In addition, as was mentioned earlier, there is a liberal amount of physical space separating the occurrences of music, further deterring any conflict between the cues.

Because the timing of the music was so critical to the ride, and the animatronic characters needed to synchronize to pre-recorded tracks (like in animation), Baker was involved in the project from the early storyboard stages.[74]

Interaction Analysis

Continuity in Disneyland's *Haunted Mansion* is provided both by frequent appearances of the theme and the narration which recurs throughout the experience. The guest does not hear the complete version of the theme song until the "finale" in the graveyard. All other music in the presentation is in the form of mood-setting underscoring, using the theme

[73]Ibid.

[74]Ibid.

with different orchestration.

Foyer

Upon entering the foyer, a simple organ line is heard, punctuated by bell tones. After a few moments the Ghost Host narration begins, with the music continuing as underscore. The music in this context functions psychologically, setting a mood for the attraction.

Stretching Room

The guest next enters the Stretching Room (actually an elevator). After a pause, the Ghost Host continues his narration, this time without music. At the conclusion of this segment the lights go out and two sound effects are heard: there is a lightning flash and a peal of thunder; guests looking up see a corpse hanging from the ceiling while a scream is heard.

Portrait Gallery

Upon exiting the elevator, the narration continues. The portrait gallery is lined with windows from which come the sounds rain and thunder. At the conclusion of the narration there are sound effects only, functioning to enhance the believability of the storm "outside."

Loading Area (The Great Hall Cue)

The narration continues upon approaching the doom buggies in the loading area, which features a background music cue using alto flute, tubular bells, occasional "hellhound" howls, and a pitched wind effect. MacDonald performed the wind, using a technique which Baker describes as follows:

> The wind was done by Jimmy MacDonald, our sound effects fellow. He had a balloon blown up and he was letting the wind out across his lips and moving his mouth to make that sound in sync with the flute. He actually played it in tune, by changing the shape of his lips as it went across there, and letting it go into the hollow of his mouth.[75]

This technique of creating wind is demonstrated in the Letterman segment at *The Monster Sound Show* (although MacDonald does not play a tune).

The unison melody of the wind and the predictable timings of the howls give a very planned feel to the entire soundtrack in this area. Baker was asked if the timing of the howl was planned as part of the score. He responded:

> The howling was the sound effects department. They were just library stuff. They just put the howling in whenever they wanted. They didn't consult me at all. That was just their ball game there–when they felt that it would work right.[76]

Figure 11 shows the placement of elements in "The Great Hall" cue.

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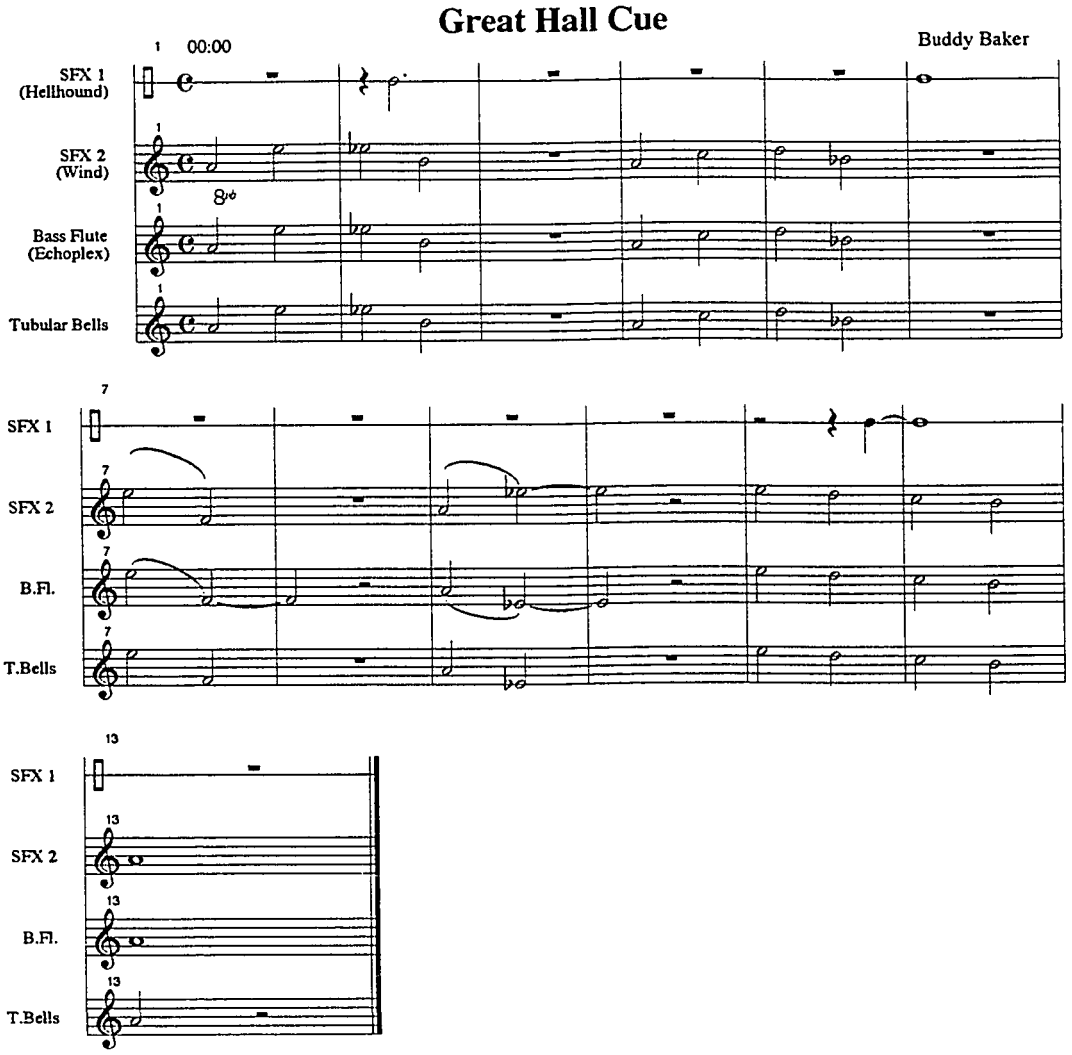
[75]Buddy Baker, telephone interview, 30 Sept. 1994.

[76]Buddy Baker, telephone interview, 17 Oct. 1994.

Figure 11

Great Hall Soundtrack Score



Transcription by author from source music used by permission of Walt Disney Publishing

The apparent simplicity of the cue is appropriate in this type of environment. Sound effects and music augment each other in creating a mood without the melody being too intrusive.

Hallway

The narration resumes after boarding the doom buggy, and continues into the first section of the hall, ending with "Shhh...listen!" From that point on there are sound effects only, which add realism but also create a mood (this is the segment that most clearly resembles similar scenes in *The Haunting*). A coffin creaks as someone cries from within "Let me out!" Off-screen sound leads the guest to imagine specters straining and pounding behind every door; ghostly voices rush down the hallway; a clock ticks loudly.

In several places wood creaks are heard, as the coffin lid is raised, as the doors stretch against their hinges. Wayne Allwine recognizes these sound effects as being created by one of MacDonald's devices (which features a bowed string, pitch-shifted by slowing the tape speed).[77]

[77]Wayne Allwine, telephone interview, 23 Sept. 1994.

Seance

The seance scene is the first that features extensive dialogue: Madame Leota's incantation. In this speech she calls upon the spirits to give various signs, most of which involve musical instruments that are seen floating around the room (tambourine, bell, etc.). She also calls for "music from regions beyond," which Baker describes as follows:

> That's the oboe again. And the other thing in the regions beyond is that eerie sound that I did. I'm sure there's a lot of slowed-down vibraphone through there. Plus your hands going over the strings of a piano with the pedal down, to give kind of an ethereal effect. Because this was all done pre-synthesizers, and we had to manufacture or create different sounds that way.[78]

There is source music under the dialogue, again still in synchronization with the basic graveyard tracks, featuring a single organ line and unison tubular bells with heavy reverberation.

In this scene the music functions both to set the mood and to provide character (Madame Leota) interaction with the environment.

Ballroom

There is narration during the transition from the seance to the ballroom scenes. Several sound effects are featured in the first part of the room, functioning as realistic character interaction (dueling pistols, etc.). Source music also contributes to the realism later in the scene, as an

[78]Buddy Baker, telephone interview. 30 Sept. 1994.

organist plays a demented solo (the "kooky organ" cue).[79] This cue is the only musical cue not synchronized to the basic tracks: it is in waltz tempo, and Baker felt that it was isolated enough from the other elements to not cause a leakage problem.[80] There is an extensive buffer both before and after this cue: the narration and sound effects leading up to it from the seance scene, and the sound effects-only attic scene that follows.

This organ cue was the result of an interesting recording session, during which 25 or 30 improvisational takes were made.[81] Baker describes the session as follows:

> [The organist] had a melody written out there–but I told him to ad lib the hold thing and crank us all the way with it! Sometimes instead of hitting one note, he'd just hit a cluster of notes. The bass line of that thing is pretty true to the tune. It's just that the melody is all screwed up.[82]

Although the cue finally chosen for the show sounds very complex, Baker states that it was performed in one pass, and was not multi-tracked.[83]

Although the organ cue does not synchronize with the rest of the attraction, one element synchronizes with the organ: the heartbeat in the attic scene plays beat one and two of the waltz tempo.

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[79]Glenn Barker, telephone interview, 28 Sept. 1994.

[80]Buddy Baker, telephone interview, 30 Sept. 1994.

[81]Barker, loc. cit.

[82]Buddy Baker, telephone interview, 30 Sept. 1994.

[83]Ibid.

Attic

The attic features sound effects only. These include screams, shrieks, and the previously mentioned heartbeat cue.

Graveyard

The basic rhythm tracks in this scene are played by contrabass, bass guitar, rhythm guitar, drums, and organ. Various source and dramatic cues synchronize to this track throughout the scene, and are placed in foreground by passing the corresponding speaker. The music has a double function in this scene: it contributes to the realism of the characters (as in the percussionist tapping on the headstone, or the "Singing Busts") and it significantly contributes to the "lightened" mood, as was discussed earlier.

Sound effects in this scene include raven caws, dog whimpers, and howls. These effects are not purposefully synchronized to the music track, although the illusion that they are is convincing. The raven caw, especially, seems to fit right in a space left before the one minute cue loops around, providing a sort of percussive commentary. Baker states, however:

> That may have been an accident, because I left that little hole in there so they would have time to make a loop out of it, so they wouldn't have cut off any sound. It's like we end on a down beat and wait out the rest of the bar to start on a new phrase. No, it was just dumb luck.[84]

[84]Buddy Baker, telephone interview, 17 Oct. 1994.

The five ghoulish musicians seen at the beginning of the trip through the graveyard are called "The Phantom Five." They are "playing" instruments featured in a source cue over the basic tracks. A percussionist beats out a rhythm on a headstone (done in the studio on two rocks), a harp player plucks chords, a trumpet player does a little improvisation, and a flute player plays a backwards flute cue (recorded playing the notes in reverse order, so a reverse playback would produce the correct tune with a weird effect). The one represented instrument that does not have a corresponding source cue is the bagpipe, which turned out to be too difficult to control. Instead an oboe was used, played out of tune.[85]

The opera singers that appear later in the scene were recorded in a session similar to that of the "kooky organ." After rehearsing the notated melody, they were encouraged to improvise as much as possible, just as long as it meshed with the harmonic movement. The results are hilarious, and something few guests get to hear in its entirety as they are hurried by.

The "Singing Bust" effect was another instance of methodology matching that of animated film: the tracks were pre-recorded by the vocalists, then people were selected on the basis of their faces. These people were filmed while lip-syncing to the recorded cues. The interesting fact is that the people selected to perform the music by Baker, and the people selected to be the busts by casting, turned out to be the same five people![86]

During the design process on the attraction, Baker was involved to the point where he knew the exact speaker placement throughout this scene, so

[85]Buddy Baker, telephone interview, 30 Sept. 1994.

[86]Buddy Baker, telephone interview, 17 Oct. 1994.

that he could decide where to separate his musical tracks in the recording. For instance the "Phantom Five" have five individual speakers for each instrument.[87]

Unloading

The narration resumes upon exiting the graveyard ("Beware of hitch-hiking ghosts!"). In the unloading area a choral version of last verse of song plays, still synchronized to previous scene.

Exit

The exit features dialogue only. Guests are conveyed up a moving walkway past the figure of "Little Leota" who says, "Hurry Back....Don't forget to bring your death certificate, should you decide to join us. Make final arrangements now. We've been dying to have you."

Summary

The apparent simplicity of the score in *Haunted Mansion* is part of what makes the attraction so popular with returning guests. In many ways, the annoyance factor is kept to a minimum by light orchestration throughout the experience. The exception, in the graveyard, is so overwhelming in its complexity that it provides a satisfying finale and

[87]Buddy Baker, telephone interview, 17 Oct. 1994.

enticement to return since it goes by too fast to take it all in, even after many visits. In some respects, *Pirates of the Caribbean* is scored as if it were a movie–over scored perhaps–in keeping with its nostalgic "Treasure Island" antecedents. In virtual reality, however, the simple approach, with much spacing of elements, as is found in the *Haunted Mansion* is likely to be more successful and less annoying to frequent participants.

Virtual Glider

Virtual Glider was created in 1993 by Evans & Sutherland. The sound environment (which dictates when and how the audio files will be used) was developed by an out-of-house programmer. The sound effects and music were also produced out-of-house.

The participant is helped into an actual hang-glider harness, which acts as a realistic interface for navigation through the experience (i.e. the harness responds identically to a real harness). After launching off of the top of a building, the glider can be maneuvered through skyscrapers, over freeways, around (or into) buildings, and past billboards. Most objects that are encountered either make sound intrinsically or create sound when contacted (for instance the crash sound when the participant runs into the side of a building). Music plays continuously throughout the experience.

The music in this product is all digitally stored, and files are triggered at different points in the experience in an attempt at interactivity. Jeff Edwards, of Evans and Sutherland, says that the decision to use digital audio rather than General MIDI was based on cost issues: disk space was

cheaper than a synthesizer. Interestingly, this is the opposite of games, where memory space is the primary consideration. Edwards thinks that the General MIDI model is the way to go in the future, however, because he would like the music to be more interactive, allowing the use of something similar to LucasArts' iMuse system. Edwards said that audio quality was also an issue: he was not sure what their music was stored as (8 bit or 16 bit, 22K or 44.1) but he thinks it could sound better if implemented as General MIDI.

Edwards was asked about his philosophy about the use of music in VR, in light of Virtual World's preference for sound effects-only environments, where audio cues provide user feedback and music is viewed as inappropriate. Edwards feels that there are three separate areas that require different approaches: information environments, entertainment environments, and the gray area being called "edutainment." Although Evans & Sutherland are a visual firm, and have only been getting into audio recently, he thinks that "sound is a subjective and yet powerful tool." He feels, especially in their work with flight simulators and military applications, that sound is essential to recreating reality, and music is tremendously effective at producing a mood.[88]

Sound Effects

The sound effects were done by Mike McDonough, at an out-of-house audio post production facility that does mostly film and video work.

[88]Jeff Edwards, telephone interview, 28 Sept. 1994.

McDonough has worked on a few projects for Evans and Sutherland, yet when VR or virtual reality was mentioned he did not recognize the terms. When he was asked about his work on *Virtual Glider* the name of the project did not ring a bell. This is not overly surprising, since the only "glider" involved (with the exception of small animated ones in the background of the sky) was part of the user interface that he would not necessarily have seen. When the footage was described to him, he remembered the project.[89]

McDonough received raw video footage (mostly flybys and different perspectives on objects) which he watched and then decided what sound effects were needed. The deadline on this project did not allow him to do any new recording, so he used effects from his own library. A short time-frame has been the rule for his work for Evans and Sutherland, not the exception.

The product developers gave McDonough little instruction other than to put in appropriate spot effects. His focus in selection was on realism: crash sounds, traffic noise, tire squeals, etc.

This author attended the Meckler Virtual Reality Convention in San Jose (May 1994), at which *Virtual Glider* was displayed. People standing in line for this environment were having trouble visualizing the imagery from just hearing the sound effects when the monitor was out of line of sight: a hang-glider with car brake squeals and massive crunching sounds was very puzzling to these listeners, and caused much joking verbal

[89]Mike McDonough, telephone interview, 12 Oct. 1994.

speculation. This author laughed when the video monitor was finally visible: the visual cityscape gave the sound effects a context lacking otherwise.

However, since the visual images and the music were both fairly ethereal, the sound effects did not match well. They were overly realistic, to the degree that they almost became comically exaggerated. McDonough's impression of what was required was that the effects had to be "bigger than life."[90] However, in this case they just seemed disproportionately large.

It is interesting that the final form or intent of this project was not adequately communicated to the sound designer. The fact that he did not know it was to be footage of a hang-gliding experience seems like an oversight. Additionally, McDonough has not experienced any of the Evans and Sutherland products in their final form, nor has he heard what music was going to be used in any of the projects he has worked on. Therefore his insight into the soundtrack as a whole is limited by communication and schedule problems.[91]

Music

Composers Kirk Bester and Sam Cardon usually do film and television work. With *Virtual Glider* they were given raw footage of the various experiences to score. The music is interactive to a certain extent: it responds to location and time in the environment (the experience has a set

[90]Ibid.

[91]Ibid.

duration). For example, the altitude of the user evokes a different musical cue. Also towards the end of the experience the music changes, gaining more energy, a faster tempo and more rhythmic definition.

Composer Sam Cardon uses the analogy of a tree to describe his approach to an interactive score, with the trunk being the point of departure (in this case the launching platform on top of a building). This trunk cue needs to be able to branch out into different directions that seem to come from the same material. Therefore all the cues must have some musical commonality. When Cardon was asked whether the commonality was harmonic, rhythmic, or both, he responded:

> Most importantly harmonic, because rhythmic things can overlap each other very easily . With music, people respond to dissonance. Sometimes the dissonance is desirable. But it's not desirable if, for example, in the hang-gliding sequence you may go into a sequence that makes you feel like you're lighter than air. But on the other hand, when you plunge into the middle of a bunch of skyscrapers of course the music content is completely different. That moment before you launch off in either direction has to be ambiguous. You can't give it away yet. So it can't really be dissonant and it can't really have emotional content, because you haven't made your decision yet.[92]

Cardon went on to say that the cues cannot have strong melodic content: they must be at a point of rest, allowing a certain amount of flexibility in the next direction which may be taken. The solution was to create a musical piece that contained several different moods, with each mood segment intended to underscore a different experience (launching, landing, etc.). They fit together in a branching and yet linear manner, since there are a finite number of experiences available in this

[92]Sam Cardon, telephone interview, 30 Sept. 1994.

environment. Although the branching segments work with their source material, the relationship gets more remote as the experience progresses. In other words, the last cue does not necessarily have much commonality with the first cue.

Cardon stated that they had very little time to complete this project, and that he would have liked to have had more. Even so, it is to Evans and Sutherland's credit that they included music in the presentation, since that is by no means the norm in the industry at present. Out of the dozens of VR product interfaces and presentations shown at the Meckler Virtual Reality Convention, only *Virtual Glider* had a soundtrack that contained both sound effects and music. The wait time for the experience was more than two hours. The fact that the musical score was being pumped out into the convention hall was most likely a siren song compared to the other dry demonstrations. The impact of the music on the visuals cannot be overlooked. As Cardon stated, without music it "seems like a video game."[93]

Often the reaction to a virtual environment can be one of disorientation and slight nausea–it can be disturbing to our normal sensory input, our sense of up and down. Without music, launching means staring at a flat colored screen (the pastel sky): there is no illusion of up. In this product however, there was a feeling of exhilaration. The opening "soaring" cue contributed greatly to the psychological interpretation of the experience as truly one of flight. Unfortunately the composer has never gotten to

[93]Ibid.

experience the finished product.[94]

Interaction Analysis

The basic structure of the soundtrack in this product is simple. The sound effects hit key events, and the music is designed to play seamlessly from one "mood" to the next. Since there is little or no overlapping of functionality, the interaction in *Virtual Glider* is autonomy.

The sound effects provide a degree of realism (interaction of the participant with the environment). Smashing into the side of a building produces a crashing sound; landing on the busy freeway results in the squealing of cars breaking. In addition, a certain amount of ambience is provided by sound effects issuing from animated billboards on the sides of buildings.

The function of music in this product is psychological (creating an affective state of the participant). The first sweep of music during the opening enhances the illusion of soaring even though there is very little visual confirmation of altitude. The music also effectively conveys the increasing intensity of navigating through the buildings, avoiding obstacles, gaining speed, and eventually negotiating a precarious landing on the freeway.

Although this experience is very short and interactivity is fairly limited at this point in its development, *Virtual Glider* gives a challenging glimpse into the potential of combined VR and audio technologies.

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[94]Ibid.

CONCLUSIONS

> What is the magical ingredient of future media? It will be the magical ingredient of past media....*talent.* [1]

It has been shown that the fragile interdependency of soundtrack elements is best served by careful consideration and intelligent planning. In light of this, it is necessary to end with some additional thoughts about collaboration.

Many of the examples of successful soundtracks discussed here have had the advantage of close communication between sound designer and filmmaker, or between composer and sound designer. There are examples of extraordinary achievements in film that benefited by a high degree of involvement by the composer from the beginning of the project, such as Bernard Herrmann's work with *Citizen Kane.* [2] There are also cases where the sound designer and the composer, working in isolation, came up with completely different perspectives on what was needed, which combined in serendipitous moments that could not have been planned. Most often though, not communicating means that a sound designer or a composer is spending time and energy on cues that will not be needed, just to avoid coming up short in dubbing. This obviously creates waste.

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[1]Ted Nelson, in Sandra Kay Helsel, ed, *Beyond the Vision: The Technology, Research, and Business of Virtual Reality* (Westport, Connecticut: Meckler, 1992), 160.

[2]Steven C. Smith, *A Heart at Fire's Center: The Life and Music of Bernard Hermann* (Berkeley, California: University of California Press, 1991), 76.

Even so, there are many well respected people, sound designers and composers alike, who prefer to not be involved in the process from the script stages. Perhaps the most notable example of this is John Williams. He has worked frequently with George Lucas and Steven Spielberg, who are known for involving the composer from an early date.[3] Yet Williams states:

> I generally find that it is better not to read the script. Reading a script and then seeing the film is rather like reading a novel and then seeing the film version of that novel–it never looks like you saw it in your mind's eye. So I prefer not to know what it is about, and just go into a darkened room and see the first cut and experience the film in terms of itself.[4]

Certainly this approach has merit–the effectiveness of Williams' scores attests to that–and yet, ironically some of his best film scores have profited from collaboration, albeit sometimes in unusual circumstances. *Jurassic Park* benefited from collaboration between Rydstrom and Williams because of their physical proximity at Skywalker Sound. Sound designer Ben Burtt modified both his sound effects and two of Williams' music cues for *Raiders of the Lost Ark* because the music happened to arrived in advance of his final deadline.[5] Even *E.T.* benefited from an extemporaneous "pre-recording" situation, since Spielberg was so inspired by the cue for the last scene that he re-edited the final footage to better match the music.[6]

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[3]Fred Karlin and Rayburn Wright, *On the Track: a Guide to Contemporary Film Scoring* (New York: Schirmer Books, 1990), 32.

[4]Don Shay and Jody Duncan, *The Making of Jurassic Park* (New York: Ballantine Books, 1993), 146.

[5]Ben Burtt, personal interview, 28 Apr. 1993.

[6]Diane Bailey, "Ten Things You Never Knew About E.T," *T.V.Guide* 39, no. 47 (Nov. 23 1991): 16.

Williams has also shown great tolerance for the restrictive guidelines of temp tracks, which is almost a form of "absentee collaboration" since the tracks may have been part of the creative process in early editing or even in the mind of the filmmaker as the picture was being made, potentially affecting decisions about mood and pace throughout production. By emulating the style of these tracks, the composer becomes part of that process.

Perhaps this preference to wait until the film is done comes out of tradition rather than its superiority as a work methodology. Granted, it is probably psychologically easier to take a print of a film into a secluded place, do the writing, and emerge some time later to face the critique, than it is to undergo constant story meetings, revisions and input.

The following statement by Gary Rydstrom contrasts dramatically with the Williams quote above:

> The way I like to work best is to read the script so I can be thinking about the film long before we're going to start on the sound....The thinking process begins by keeping an ear out for sounds that you can collect, so the first step is recording as much of a variety of interesting sounds that may or may not work for that film. After the sounds have been recorded, you sift through them like a gold prospector to find the few interesting nuggets. It takes a lot of recording to find something good.[7]

His words are echoed by many film composers as well, but this philosophy is more prevalent among sound designers. This creates a disparity: if the sound designer is involved from an early date but the composer is added on at the end of the project without communication

[7]Bobby Owsinski, "Designing the Soundtrack," *Film and Video* 10 no.4 (April 1993): 103.

between them, many months of work on the part of the sound designer might go for nothing when it comes time for final dubbing.

With computer games, there would seem to be two models for collaboration. The first is the LucasArts/Cyan model where a small team completes the project in-house. Although at LucasArts the team members for visuals and sound work in separate units, there is still a large amount of communication. At Cyan all the work, including sound effects and music, is done in-house. The second model is exemplified by Trilobyte's approach to *7th Guest,* and is more similar to the usual approach in the film industry: although the product was designed by a small in-house team, the sound design, production sound, and music were contracted out. This resulted in less collaboration and, arguably, more (potentially avoidable) mistakes.

During the making of *Jurassic Park,* Gary Rydstrom took the early Raptor vocabulary down to help the puppeteers in synchronizing their movements. In the case of a computer environment, it would seem just as helpful to have the option of animating the images to match a particularly enticing sound cue, instead of cutting a sound to fit a pre-existing image. The idea that sound is part of "post-production" is ingrained not only in the minds of directors and producers, but in the minds of the sound creators themselves. In-house situations still do not necessarily result in pre-recording of the music or the sound effects: Chris Brandkamp, sound designer and composer at Cyan, states that he needs to see the finished art

in context before he can come up with the appropriate sound effect.[8] The belief that audio exists to serve the visuals is prevalent in the industry, and the practice of creating the visuals first and then producing a sound that will best support them is a logical consequence.

Randy Thom believes that getting to a deeper level of creativity demands collaboration–inspiration across disciplines.[9] This does not necessarily mean attending every story conference, but, at the very least, composers and sound designers need to be concerned about the way in which they are sharing the soundtrack, and to get involved to the degree that they can–like Williams and Rydstrom did with *Jurassic Park*–and ask a few questions about what they may be up against in a given scene. With interactive projects like CD-ROM and virtual reality, collaboration with the designers from an early stage becomes more critical, due to memory and technological constraints.

Ultimately, what Randy Thom said about sound designers might also be applied to composers:

> Some people say they'd rather just see the picture when it's finished–but I'm not sure that those are the best people.[10]

There have always been a handful of filmmakers, like Welles, Hitchcock, and Lucas, who have exploited the potential of sound in true collaborations with composers and sound designers. It can be hoped that

[8]*The Making of Myst*, Quicktime Movie on *Myst* CD-ROM, Cyan, Spokane, Washington, 1994.

[9]Randy Thom, personal interview, 7 Apr. 1993.

[10]Ibid.

the lessons learned in superior films, combined with new discoveries, will challenge developing media to use sound in enlightened ways. It will then be up to a new type of artist to meet this challenge.

> The hybrid artist of the future is the person who's got the imagination of a film writer and director but who understands the technology....These people will come out of the software industry, they'll come out of the film and television industry, and they'll come out of garages. It's exciting.[11]

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[11]Paul Rhodes, in Katherine Stalter, "Multimedia: Traditional Producers Are Exporing the Worlds of Interactive and Other New Media," *Film and Video* 10, issue 9 (Sept. 1993): 83.

APPENDIX A

Sound Designer Questionnaire

1. What is your usual approach to sound design? Do you approach each project with a unifying concept for sfx treatment, or take it on a scene by scene basis?

2. How does the style and mood of the film affect the quality of sound you create?

3. What do you think of these three approaches to sound design: literal (i.e. footsteps used for footsteps), analogous (i.e. hose used for waterfall), non-literal (i.e. crumpled cellophane used for fire)? Which do you think you use most often?

4. How do you feel about the balance between effect and realism? In other words, do you think it is more critical to have an accurate, naturalistic effect (the geographically precise bird call, the correct car engine), or one that creates the desired response (i.e. an ominous bird sound, a spluttering jalopy)? Does this balance change from scene to scene, or film to film, or is it used consistently throughout an entire film?

5. Do you conceive of the sound effects track compositionally--as a mixture of foreground, middleground and background figures, or high, mid and low pitched timbres--or more pragmatically (i.e. what you see is what you hear)?

6. Do you feel that there is adequate communication between the sound designer, the composer, and the director? Would it be a help or a hindrance for you to know more about what the music is doing in a given scene?

7. What do you think are the primary functions of sound effects? What do you think about these categories listed by other sources? Can you rate them on a scale of 1-10 in importance?

Realism

____Simulating reality; enhancing realism

____Creating environment

____Establishing locale

____Off-screen sound (extending the limits of what is seen; implying non-existent locations; adding or creating something off scene that is not really there)

____Emphasizing and intensifying action

____Confirm character interactivity with environment

Psychological

____Subtext/symbolic meaning

____Direct the emotion of the audience in the desired channel

____Communicate mood of character

____Match the mood of the film

Mechanical

____Continuity

____Defining space

____Setting pace

____Sound replacing image to eliminate cluttering cut-aways

____Matching, or distracting viewer from, filmic devices (dissolves, etc.)

Narrative

____Signature effects/motifs

____Time cues

____Complementing and enhancing the viewer's understanding

____Story component (conveying narrative content not present in visuals)

APPENDIX B

Game Sound Questionnaire

1. What do you consider the function of music in games to be? How do you think this differs from film, and how is it similar?

2. How does the composer's job differ when approaching this medium from others (film, television, commercials, etc.)? What additional skills are needed? What skills are the same?

3. What functions do the sound effects have in games?

4. Describe your approach to the creation of a "sound track" for a game, from the original idea, through use of midi software, to implementation in the game environment.

5. How does the use of the iMuse system affect the way you compose your musical segments? Describe how you deal with transitions, segues, etc.

6. What do you anticipate as being the most challenging future developments in technology? Will these impact upon your current creative approach?

7. As the audio quality and sound storage capacity continues to improve, will the approach to audio for games stay the same or begin to become even more like film? Will the people working in this area continue to be programmers or will they begin to come from a film background?

APPENDIX C

Survey: Audio in *7th Guest* and *Myst*

From: tishe@cruzio.com Path: cruzio!tishe

Subject: HELP: *Myst*/*7th Guest* audio survey

Newsgroups: comp.sys.mac.games

Followup-to: Reply-to: tishe@cruzio.com

Keywords: audio survey

I'm doing my Master's thesis on sound effects and music in selected media, and one of the areas I've looked at is interactive CD-ROM environments: specifically *Myst* and *7th Guest.* If you have a couple of minutes, and have played these games, it would be very helpful for my research if you could email me the answers to the follwing questions. Yes or no answers are okay, but more detail is welcome too.

tishe@cruzio.com

Survey: Audio in *Myst* and *7th Guest*

Myst:

1. Do you think the sound effects added to the realism of the environment? How well did they match your expectation of what "noise" the various places and objects would make?

2. Was there too little, too much, or just the right amount of music in Myst? Did it enhance your enjoyment of the experience?

7th Guest:

1. Did the music add to your enjoyment of the game play?

2. Did you find the music to be distracting or repetitive?

3. Did you play the Mac version, or the PC version?

4. Did you experience audio balance problems (such as not being able to hear the dialogue segments over the music, etc.)?

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Theme park attraction that features a combination of walk-through and ride-through areas with special effects and animatronic figures. Script and theme song lyrics ("Grim Grinning Ghosts") were written by Xavier Atencio; theme song melody and score were composed by Buddy Baker.

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Theme park attraction that features a boat ride through various scenes containing animatronic figures. Script and theme song lyrics ("Yo Ho, Yo Ho, A Pirate's Life for Me") were written by Xavier Atencio; theme song melody and score were composed by George Bruns.

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Author briefly discusses Halloween traditions including horror films such as *The Haunting*.

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Interview with sound effects designer Frank Serafine.

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Interview of creative team responsible for developing Neptune's Kingdom in Santa Cruz.

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Interviews with Bruce Broughton, James Newton Howard, Michael Kamen, David Newman and Alan Silvestri.

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John Hench, part of Disneyland's Imagineering team since 1955, shares memories of the early days of the park.

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Film composer discusses his scoring philosophy and equipment.

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Detailed discussion of the post-production process at Skywalker Sound.

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Brief discussion of Frank Serafine's sound effects for the film.

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Interview includes a brief discussion on manipulation of SFX elements in composition.

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Industry professionals discuss sound in multimedia.

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Interview with game audio producer Mark Miller.

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Includes sidebar on Team Fat, music producers for many games including*7th Guest.*

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Discussion of the original television series, including which composers did which cues, the use of previous cues to track additional episodes, and various other television scoring practices.

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LucasArts article discussing audio in games. Includes brief background and current technology.

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Interviews with sound designers Ben Burtt, James G. Stewart, Bill Varney and Walter Murch.

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Brief overview of Williams' film and television scoring career, including quotes on his theme development for *Jurassic Park*.

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Technical explanation of all facets of the industry. Emphasis on technology rather than aesthetics.

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Section on "sound film" contains many important artistic considerations for the use of music and sound effects in film.

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Discussion of the different types of source music and the processes involved in creating them. Cites numerous examples. Index and extensive annotated bibliography.

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Rather flowery but nonetheless thought-provoking discussion of the role of sound in film. Although Balazs quotes extensively from his original work from the 30's, much of this quite prophetic discussion is valid for consideration today.

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Collection of essays by industry professionals, including Raymond Fielding, James G. Stewart, and Bernard Herrmann. Interesting reading, offering many valuable insights.

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Includes interview with Bill Varney, sound designer for *Raiders of the Lost Ark* and *The Empire Strikes Back.*

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Psychologist's view of music, with emphasis on testing methodology. Chapter Four, "Events of the past," discusses interesting aspects of the relationship between music and the emotions.

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Sociological study of freelance composers in Hollywood, focussing on career development, the social structure of the film industry, and the subjective nature of commercial work.

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Collection of Mix Magazine articles about sound, including interviews with Walter Murch, James Stewart, and an article about the *Twin Peaks* soundtrack.

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Extensive survey, including telling comments about the romantic style often used in film scores.

Hagen, Earle. *Scoring for Films: A Complete Text.* U.S.A.: E.D.J. Inc., 1971.
Handbook of technical information for the film scorer. Relevant section: "a symposium on the composers views towards the psychology."

Halas, John and Roger Manvell. *The Technique of Film Animation.* N.Y.: Hastings House, 1959.
Thorough discussion of processes involved in creating various types of animated film. Useful illustrations and diagrams. Sections on sound, although technologically dated, provide some useful guidelines for all types of film.

Handel, Stephen. *Listening: An Introduction to the Perception of Auditory Events.* Cambridge, Massachusetts: MIT Press, 1989.
Comprehensive text on acoustics and music perception.

Harrell, Jean Gabbert. *Soundtracks: A Study of Auditory Perception, Memory and Valuation.* Buffalo, N.Y.: Prometheus Books, 1986.
Esoteric essay dealing primarily with music criticism. Chapter Three, "Film music: expression and shallowness," deals specifically with the film score, proposing some interesting ideas on the function of music in film.

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Original screenplay for the film, with selected storyboard art.

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Krueger, Myron W. *Artificial Reality II.* Reading, Massachusetts: Addison-Wesley, 1991.
Discussion of real and potential applications by one of the "fathers" of Virtual Reality. Includes consideration of the interaction between visuals and sound.

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Application of dramatic principles to human-computer interaction. Includes examples of games, virtual reality, and a brief discussion of multi-sensory considerations.

---, ed. *The Art of Human-Computer Interface Design.* Reading, Massachusetts: Addison-Wesley, 1990.
General overview for creators of computer interfaces, originally created as part of a training course at Apple Computer. Includes articles dealing with the audio design component.

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Lundin, Robert W. *An Objective Psychology of Music.* Malabar, Florida: Robert E. Krieger, 1985.
Interdisciplinary textbook. Chapter Nine, "The affective response to music," brings up some interesting points for film scoring.

Lustig, Milton. *Music Editing for Motion Pictures.* New York: Hastings House, 1980.
Technical considerations of film editor's job. Valuable for a film composer involved in projects with no budget for a film editor. Includes examples of cue sheets, bar charts, etc. Glossary, index.

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Manvell, Roger and John Huntley. *The Technique of Film Music.* London: Focal Press, 1957.
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Overview of the field of auditory perception, attempting to relate psychological aspects of sound to physiological mechanisms. Includes a brief section on the combined effects of vision and auditory localization. (Chapter five: "Space perception").

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Suggestions and many concrete examples for use of sound effects, and techniques for dealing with producers, directors, and machines.

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Prendergast, Roy M. *A Neglected Art: A Critical Study of Music in Films.* New York: New York University Press, 1977.
Critical study of film composers and their works, including fascimiles and detailed discussion of numerous scores. Organized in three sections: History, Aesthetics and Technique.

Rheingold, Howard. *Virtual Reality.* N.Y.: Summit Books, 1991.
Overview of current VR technology and philosophy, including the significance of sound.

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Sarris, Andrew. *Interviews with Film Directors.* N.Y.: Bobbs-Merrill, 1967.
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Discussion of the communicative powers of sound, including many important considerations for sound design.

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Includes section on sound design at Skywalker Ranch, and creation of the John Williams score.

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Biography of the composer, including his early work in radio with Orson Welles, and his scores for *Citizen Kane* and many other classic films.

Taylor, Derek. *The Making of Raiders of the Lost Ark.* New York: Ballantine Books, 1981.
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Overview of the animation process. Includes section on sound that contains descriptions of techniques, examples, interesting anecdotes, and a segment on sound effects editor Jimmy MacDonald.

Thomas, Tony. *Film Score: The View From the Podium.* New York: A.S. Barnes and Co., 1979.
Film composers discuss their work. Discography.

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Interesting discussion of the use of music, including music as sound effects, in Disney projects.

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Selection of articles discussing sound in feature-length narrative film, including the "The Sound Designer" (discussing Frank Serafine, Jimmy MacDonald and Ben Burtt).

Wyman, Dan. *Scoring for Time.* Photocopy. N.d.
Manuscript of text on film scoring.

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A disorganized treatment of the subject, which nonetheless cites an occasional excellent source and is often thought-provoking.

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Discussion in the last section of sound structures, functions, and sound/picture combinations.

Computer Games

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Interactive, narrative-style computer game based on the film of the same title. Features extensive use of sound effects and programmed arrangement of segments of the John Williams score.

Monkey Island. CD-ROM. San Rafael, California: LucasFilm Games, 1993.
Interactive narrative-style computer game. Features captioned dialogue, and sequenced music files.

The Manhole. CD-ROM. Spokane, Washington: Cyan, 1994.
Environment-oriented children's exploration game. Extensive use of sound effects and digital music cues.

Myst. CD-ROM. Spokane, Washington: Cyan, 1994.
Environment-intensive game. Extensive use of ambient sound, some use of digital music cues.

7th Guest. CD-ROM. Medford, Oregon: Trilobyte, 1994.
Puzzle game embedded in graphic environment. Features combined use of MIDI music, digital music, recorded dialogue and sound effects, and QuickTime movie segments.

Film

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Mickey Mouse cartoon short that features music and Foley effects.

Lucas, George, prod. *Raiders of the Lost Ark.* LucasFilms, 1981.
Score by John Williams; sound design by Ben Burtt.

Spielberg, Steven. *Jurassic Park.* Universal Pictures, 1993.
Score by John Williams; sound design by Gary Rydstrom.

Wise, Robert, prod. *The Haunting.* Metro-Goldwyn-Mayer, 1963.
Score by Humphrey Searle; sound recordist, Gerry Turner.

Interviews

Allwine, Wayne. Telephone interview. 13 Sept. 1994.
Sound effects editor/foley artist and voice of Mickey Mouse. Discusses his experiences working with Jimmy MacDonald at Disney Studios.

---. Telephone interview. 23 Sept. 1994.
Analysis of sound effects cues in *Pirates of the Caribbean* and *Haunted Mansion,* based upon his years of working with Jimmy MacDonald.

Atencio, Xavier. Telephone interview. 20 July 1994.
Scriptwriter and lyricist for Disney attractions. Discussing his experience with writing and recording dialogue for *Pirates of the Caribbean* and *Haunted Mansion,* and his work with Buddy Baker and George Bruns.

---. Telephone interview. 8 Aug. 1994.
Follow-up call for clarification.

Baker, Buddy. Telephone interview. 28 July 1994.
Composer for numerous attractions in the Disney theme parks as well as Disney television productions, from the 50's to the 80's. Discusses his work on *Haunted Mansion,* his collaboration with sound effects editor Jimmy MacDonald, and the process of composing for theme park attractions.

---. Telephone interview. 20 Aug. 1994.
Follow-up call.

---. Telephone interview. 31 Aug. 1994.
Discusses details of the score for *Haunted Mansion.*

---. Telephone interview. 30 Sept. 1994.
Discusses details of the score for *Haunted Mansion.*

---. Telephone interview. 17 Oct. 1994.
Discusses sound effects relationship to musical cues in *Haunted Mansion.*

Barker, Glenn. Telephone interview. 28 Sept. 1994.
Media Designer for Walt Disney Imagineering. Discusses the soundtrack for *Haunted Mansion,* including the synchronization methods.

Brandkamp, Chris. Telephone interview. 16 Aug. 1994.
Sound designer for Cyan's *Myst* and composer/sound designer for *The Manhole.* Discusses his process, background, and differing approach for the two projects.

---. Telephone interview. 13 Sept. 1994.
Follow-up call.

Brower, Russell. Telephone interview. 13 Aug. 1994.
Composer for Disney theme park attractions, and sound designer for animated television shows. Discusses recent changes in the process of soundtrack development for Disney parks, and his musical philosophy.

---. Telephone interview. 26 Sept. 1994.
Follow-up conversation about *Haunted Mansion* organ cue recording session.

Burtt, Ben. Personal interview. 28 Apr. 1993.
Sound designer for *Star Wars* and *Raiders of the Lost Ark.* Discusses his approach to sound design, and specific examples of his process for *Raiders of the Lost Ark.*

---. Telephone interview. 5 May 1993.
Discussing use of temp tracks for *Raiders of the Lost Ark.*

Cardon, Sam. Telephone interview. 30 Sept. 1994.
Composer for Evans and Sutherland's *Virtual Glider.* Discusses his solution to the interactivity challenge.

Coburn, Brian. Telephone interview. 27 July 1994.
Composer and sound designer for Sega of America. Discusses the Sega game platform, and his work for the CD-ROM version of *Jurassic Park.*

Cohen, Jonathon. Personal interview. 12 July 1993.
Apple computers programmer and sound designer. Discussing his experience with Sonic Finder, and similar projects.

Edwards, Jeff. Telephone interview. 28 Sept. 1994.
Business Development Manager at Evans & Sutherland. Discusses the sound effects and music used in *Virtual Glider,* and his expectations for future music implementation.

Gordon, Lauren. Telephone interview. 14 Sept. 1994.
Agent representing John Williams. Briefly discusses the point at which he becomes involved in his projects.

Herrington, Joe. Telephone interview. 8 Feb. 1994.
Sound designer at Walt Disney Imagineering. Discusses the past and present of sound design for Disney parks, his philosophy, technology and trends.

Huffman, Eric. Telephone interview. 13 Sept. 1994.
Sound designer at Virtual Worlds. Discusses their use of audio in VR environments, and future implementations.

Jackman, Bob. Telephone interview. 9 Aug. 1994.
Former head of the music department at Walt Disney Studio. Discusses his work overseeing the production of soundtracks for Disneyland.

Land, Michael and Peter McConnell. Personal interview. 25 Mar. 1993.
Composers and programmers for LucasArts games. Discuss their work with past and present products, future trends in game audio, the challenges of composing for game platforms, and the differences in film and game scores.

Land, Michael. Telephone interview. 6 Jan. 1994.
Discusses LucasArts first digital audio score for *Rebel Assault,* and the implications of this for future products.

---. Telephone interview. 23 Aug. 1994.
Discusses underscoring techniques during segments of dialogue in games.

Mangini, Mark. Telephone interview. 22 Sept. 1994.
Sound designer for films including *Beauty and the Beast* and *Aladdin.* Discusses use of realism in soundtracks for animation.

Perry, Scott. Telephone interview. 14 Sept. 1994.
Librarian at MGM/Turner. Discussed status of score to *The Haunting.*

Powell, Sam. Telephone interview. 27 July 1994.
Composer for game platforms, including Sega's *Jurassic Park* Genesis release. Discusses the limitations and challenges of composing for games.

Ross, Barend. Personal interview. 14 Nov. 1992.
Composer for cartoons. Discusses use of notated score in planning music around action and sound effects.

Rydstrom, Gary. Personal interview. 23 Mar. 1993.
Sound designer for *Termintor 2, Backdraft, Jurassic Park*. Discusses functionality of sound effects in film, the sound design process, and issues of collaboration.

---. Telephone interview. 3 Aug. 1993.
Discusses sound design on *Jurassic Park*.

Sanger, George. Telephone interview. 25 July 1994.
Composer for various game titles including Trilobyte's *7th Guest* and *11th Hour*. Discusses his promotion of the General MIDI standard, and his work with the new CD-ROM medium.

---. Telephone interview. 4 Aug. 1994.
Discusses audio balance problems during dramatic segments of *7th Guest*.

Staunton, Web. Telephone interview. 6 July 1994.
Sound editor for Trilobyte's *7th Guest* and *11th Hour*. Discusses audio post-production process and challenges.

Tanner, Ted. Personal interview. 19 Aug. 1994.
Programmer for Crystal River Engineering. Discusses the current and future products implementing 3-D audio processes.

---. Telephone interview. 1 Aug. 1994.

Thom, Randy. Personal interview. 7 Apr. 1993.
Sound designer at Skywalker Ranch. Discusses his philosophy and approach to film sound design.

Wyman, Dan. Telephone interview. 11 Oct. 1994.
Composer for *The Lawnmower Man* and other films. Discusses his use of non-tonal textures in film scoring.

Miscellaneous Media

The Making of Myst. QuickTime movie on *Myst* CD-ROM. Spokane, Washington: Cyan, 1994.
QuickTime segment features overview of production on the game, including brief interviews with sound designer Chris Brandkamp and composer Ryan Miller.

Virtual Reality. Videocassette. Media Magic, 1991.
Video featuring overviews of several VR programs.

Miscellaneous Sources

Atencio, Xavier. *Disneyland Pirates of the Caribbean Script.* Photocopy. N.d.
Script for the narration and dialogue in the attraction.

---. *Disneyland Haunted Mansion Script.* Photocopy. N.d.
Script for the narration and dialogue in the attraction.

Bajakian, Clint. Questionnaire from author. 1 June 1993.
Questions on creating music and sound effects for computer games.

Beeck, Kellyn. E-mail to author. 15 July 1994.
Answers to a query about the creation of the *7th Guest* soundtrack.

Brower, Russell. E-mail to author. 13 Sept. 1994.
Follow-up to telephone interview.

---. E-mail to author. 10 Oct. 1994.
Follow-up to telephone interview.

Brubaker, Roberta. E-mail to author. 1 Nov. 1993.
Answer to query about conversion of Audio-Animatronics figures to digital format.

Eastman, Tish. Letter to Gary Rydstrom. 23 Sept. 1993.
Follow-up to telephone interview.

Hymns, Richard. Questionnaire from author. 8 April 1993.
Questions on sound design considerations.

Land, Michael. E-mail to author. 3 Mar. 1993.
Follow-up to telephone interview.

---. E-mail to author. 19 Jan. 1994.
Follow-up to telephone interview.

---. Questionnaire from author. 1 June 1993.
Questions on creating music and sound effects for computer games.

McConnell, Peter. Questionnaire from author. 1 June 1993.
Questions on creating music and sound effects for computer games.

Rydstrom, Gary. Letter to author. 21 Nov. 1993.
Follow-up to telephone interview.

---. E-mail to author. 10 Oct. 1994.
Follow-up to telephone interview.

Thom, Randy. Questionnaire from author. 3 April 1993.
Questions on sound design considerations.

"THX: Perfect Sound for Home Theaters." Photocopy. N.d.
One page article about the THX system.

Music Scores

Baker, Buddy. *Haunted Mansion.* Photocopy. 1968.
Surving segments of original score and parts, including score for basic tracks in the "graveyard scene" and parts for "The Phantom Five."

Bruns, George. *Pirates of the Caribbean.* Photocopy. 1967.
Piano conductor score for arrangement of "Yo Ho, Yo Ho, A Pirate's Life for Me." Other score segments appear to have been lost or destroyed.

Williams, John. *Raiders of the Lost Ark.* Photocopy. 1981.
Complete score (except the closing credits) for the film.

Recordings

Haunted Mansion. Audiocassette. N.d.
Duplicate of show tape featuring all dialogue, music and sound effects cues as they appear in the attraction.

Pirates of the Caribbean. Audiocassette. N.d.
Duplicate of show tape featuring all dialogue, music and sound effects cues as they appear in the attraction.

Williams, John. *Raiders of the Lost Ark.* Audiocassette. 1981.
Duplicate of original session tapes featuring all musical cues for the film.

Virtual Reality

Virtual Glider. Evans and Sutherland. 1993.
Immersive environment featuring a hang-glider harness as a user interface and a soundtrack containing music and sound effects.

Acoustic Mountain. Crystal River Engineering. 1994.
Immersive environment demonstrating processing of audio in three-dimensional space.